

International Representatives



*Committed to the
promotion of energy
sustainability through the
cost effective deployment
of reliable, ground source
heat pump technology.*

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North America • Asia • Europe • South America

GROUND LOOP DESIGN

Geothermal HVAC Design Studio



Advancing the Art of Geothermal Design

Professional Power for Co

See why Ground Loop Design is a must for the



Exceptional Functionality

GLD's unique Studio Link™ system connects the building loads/heat pump matching modules to the ground heat exchanger design modules. Once linked, changes made in either the loads or the heat exchanger modules are recognized automatically and the program instantly updates the other modules. **Design optimization has never been easier!**

Superior Flexibility

Imagine the flexibility of simultaneously loading custom heat pump data, calculating full load hours, managing hundreds of individual building zones and designing multiple heat exchanger options, all while observing every pertinent parameter on a single screen. **Design productivity has never been greater!**

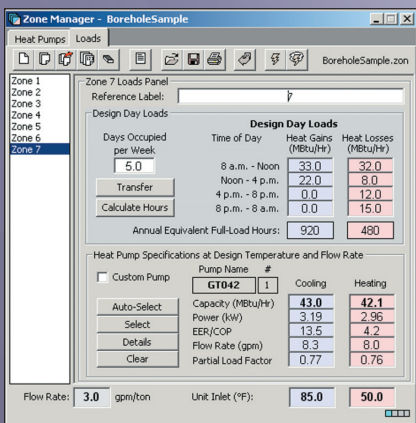
Unsurpassed Accuracy

GLD is a commercial grade heat exchanger design program which utilizes algorithms based on the most sophisticated mathematical models available to calculate long term thermally stable designs. **Design with confidence!**

Dependable Loop Field Designs in 4 Easy Steps

1) Start by choosing the best method of entering building loads data

Choose from several options: Quickly import data from Excel files and/or external load calculation programs such as the Trane System Analyzer, or input the loads directly into the program.



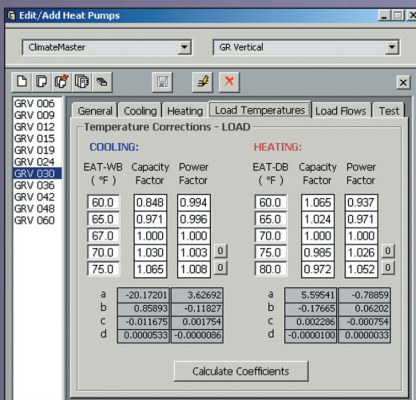
To match the widest possible range of users' needs, GLD Professional and LE Plus versions provide two different loads modules (GLD LE contains only the Zone Manager module).

The **Zone Manager** loads module (shown) is a precise analysis tool for an unlimited number of zones and is crucial for complex design applications (such as those requiring the use of multiple heat pump manufacturers). Users input loads one zone at a time and match pumps automatically or manually.

The **Average Block** loads module offers a rapid method of entering whole systems information for designers who do not desire to input loads data for a fully zone divided installation. Rather than matching specific pumps to each zone, this module uses a particular, user defined style of pump and matches it in an average way to the entire installation.

2) Go on to select a heat pump from GLD's library, or input your own

Included in all three versions, Professional, LE Plus & LE, is an extensive database of water-to-water and water-to-air pumps. Build designs utilizing the manufacturer and model you prefer or click "select" and GLD will instantly choose the best pump based on entered loads. If the heat pump you require is not listed or if you use a custom pump, override the automatic features and directly input custom specifications.



Included in GLD are full heat pump libraries from:

- ▶ Addison
- ▶ Carrier
- ▶ Climatemaster
- ▶ Econar
- ▶ Florida Heat Pump
- ▶ McQuay
- ▶ Trane
- ▶ WaterFurnace
- ▶ Plus, users can add additional pump libraries

Complex Commercial Design

professional Georexchange designer & engineer

3) Now, design the heat exchanger and you'll realize why GLD is truly unique

Purchase the power of GLD Professional and enjoy the flexibility of designing vertical bore, horizontal trench and surface water loops.

Horizontal Design Project - HorizontalSample

Calculate | Fluid | Soil | Piping | Configuration | Extra kW | Information

Ground Field Arrangement

Trench Layout

Number: 20 Depth: 6.0 ft
Separation: 12.0 ft Width: 18.0 in

Pipe Configuration in Trench

Total Number of Pipes: 4
Vertical Separation [Y]: 24.0 in
Horizontal Separation [X]: 18.0 in

Modeling Time Period

Prediction Time: 10.0 years

Horizontal

Surface Water Design Project - SurfaceWaterSample

Calculate | Fluid | Soil | Piping | Surface Water | Extra kW | Information

Surface Water Properties

Surface Water Temperatures at Average Circuit Pipe Depth

Summer: 46.0 °F Winter: 39.2 °F

Surface Water Temperatures at Average Header Pipe Depth

Primary

Summer: 83.0 °F Winter: 35.0 °F

Branches

Summer: 75.0 °F Winter: 32.0 °F

Details (Reference Only)

Surface Water Type: Pond

Surface Area: 8000 ft²

Circuit Pipe Depth: 12.1 ft

Surface Water

Borehole Design Project - BoreholeSample

Calculate | Fluid | Soil | U-Tube | Pattern | Extra kW | Information

Calculation of Required Bore Lengths

Calculate

	COOLING	HEATING
Total Length (ft):	4452.1	4371.7
Borehole Number:	30	30
Borehole Length (ft):	148.4	145.7
Ground Temperature Change (°F):	+2.4	+2.5
Unit Inlet (°F):	85.0	50.0
Unit Outlet (°F):	94.8	43.8
Total Unit Capacity (MBtu/hr):	458.2	409.7
Peak Load (MBtu/hr):	342.0	243.0
Peak Demand (kW):	25.3	19.8
Heat Pump EER/COP:	16.4	4.2
System EER/COP:	13.5	3.6
System Flow Rate (gpm):	85.5	60.8

Optional Cooling Tower

Condenser Capacity (MBtu/hr):	198.4	48 %
Cooling Tower Flow Rate (gpm):	26.8	
Cooling Range (°F):	15.0	
Annual Operating Hours (hr/yr):	1193	Load Balance

Vertical

The user interface offers outstanding functionality and ease of use: access and modify all design parameters instantly.

Open a horizontal, vertical or surface water module and "link" to the loads module. Unsure about which design is best for the site conditions? Open multiple heat exchanger modules, link them all to the loads, and simultaneously compare.

Borehole Design Project Report - 10/20/2003

Project Name: Borehole Design Sample Project Project Start Date: 20/2002

Lead File: BoreholeSample.m

Calculation Results

	COOLING	HEATING
Total Length (ft):	4452.1	4371.7
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Input Parameters

Fluid	Soil
Flow Rate: 10 gpm/hr	Ground Temperature: 62.0 °F
Fluid: 23.5% Propylene Glycol	Thermal Conductivity: 1.30 Btu/(h*in*°F)
Specific Heat (Btu/lb*°F): 0.40	Thermal Diffusivity: 0.75 ft²/h²
Density (lb/ft³): 64.0	

Piping

Fluid	Soil
Pipe Type: 1/2 in (12.7 mm)	Radius Pipe Thickness: Average
Pipe Type: Tubed - SDR11	Borehole Diameter: 6.00 in
Pipe Material: 0.150 in (3.81 mm) PPR	Outer Thermal Conductivity: 1.00 Btu/(h*in*°F)
U-Tube Configuration: Single	Borehole Thermal Resistance: 0.22 h*in²/Btu

Pattern

Modeling Time Period	Extra kW
Vertical Grid Arrangement: 6 x 3	Pump Power: 1.9 kW
Borehole Separation: 20.0 ft	Cooling Tower Pump: 0.2 kW
Borehole per Parallel Circuit: 2	Cooling Tower Fan: 1.3 kW
	Additional Power: 1.0 kW

Heat Pump

Manufacturer: Waters	Load Balance
Model: P-1000	48 %
Design Heat Pump Unit Load Temperature: Cooling (°F): 55.0	Condenser Capacity (MBtu/hr): 198.4
Water to Air: 55.0 °F	Cooling Tower Flow Rate (gpm): 26.8
Water to Water: 100.0 °F	Cooling Range (°F): 15.0
	Annual Operating Hours (hr/yr): 1193

Ground Loop Design Professional is the only program with this feature.

Entering information into the heat exchanger modules is simple and straightforward. Please see the *Getting Started Guide* for complete details.

4) Next, communicate and present the finished product

Sending customized reports to vendors, customers, clients and colleagues as well as collaborating on a design with a coworker halfway around the world has never been easier. GLD offers a variety of communication tools to help you work effectively.

At any step in the design process, you can choose from a variety of professional reports including loads/zone and heat exchanger reports.

GLD includes many other advanced features, such as:

► A hybrid cooling tower system calculation tool (shown)

► Instant metric / English unit conversion

► Fully customizable reference tables for everything from thermal properties of soil & rocks to mean earth temperatures, to fluid properties, and grout conductivity values

► Calculators for circulating pump power, soil diffusivity, and equivalent hours

► Conversion to virtually any language is possible. Chinese, Korean, and Japanese versions are currently available

Optional Cooling Tower

Condenser Capacity (MBtu/hr):	198.4	48 %
Cooling Tower Flow Rate (gpm):	26.8	
Cooling Range (°F):	15.0	
Annual Operating Hours (hr/yr):	1193	Load Balance