GEOMAX®
Geothermal
HVAC Systems

Volume
2

CLOSED LOOP GEOTHERMAL SYSTEMS

Horizontal Loop Field Installation Guide

Slinky Installation Guide

CLOSED LOOP GEOTHERMAL SYSTEMS

Installation Guide

4376 Bristol Valley Road, Canandaigua NY 14424
(800) 572-7831 (585) 229-2265 FAX: (585) 229-4585
www.eagle-mt.com

Table of Contents

Chapter 1

Installing a Horizontal Loop Field

To ensure a successful installation of horizontal loop fields we recommend you read this document carefully.

This document will give you a brief overview of how to complete the following: Job site analysis, site excavation, pressure testing, pipe placement, header design and backfilling.

At no time should this document be understood as modifying any local or state codes or safety regulations.

Job Site Analysis

Excavation and backfilling methods vary a great deal depending on the area in which you are located and the specific site soil conditions. If you do not know your exact soil conditions, a soil survey from the U.S. Soil Conservation Service office for the proposed site will describe the soil by layer down to the 6-foot level. This will help to determine the equipment you will need for successful excavation by indicating the types of plants, presence of rocks, and unstable soils. In most applications it is ideal to use a track excavator with a 36" bucket.

In the case where your buried geothermal pipes contain antifreeze material passing within 5 feet of any wall, structure or water pipe, the tubing should be insulated with R2 minimum closed cell insulation. Also avoid site plans, which could require sharp bends in tubing.

Special consideration needs to be taken prior to design for sites with

- Very small lots
- Large rock formations

Eagle Mountain Inc.
(800) 572-7831 (585) 229-2265 FAX: (585) 229-4585
www.eagle-mt.com

- High water tables
- Large amounts of fill
- Steep grades
- Heavily wooded areas
- Or other concerns with regard to installation

Warnings

- Prior to design and excavating be sure to have all utilities flagged to avoid costly and potentially dangerous damage. **You can call for a stake out (800) 962-7962**
- Prior to and during excavation all OSHA regulations and local government codes must be followed.

General Notes

- Try to keep tubing free from debris at all times. Preventing problems can be done by taping the ends of the tubing when not in use. You should also follow this procedure after you have made a cut in the field.
- Pressure testing will be key to the success of your project.

Site Excavation

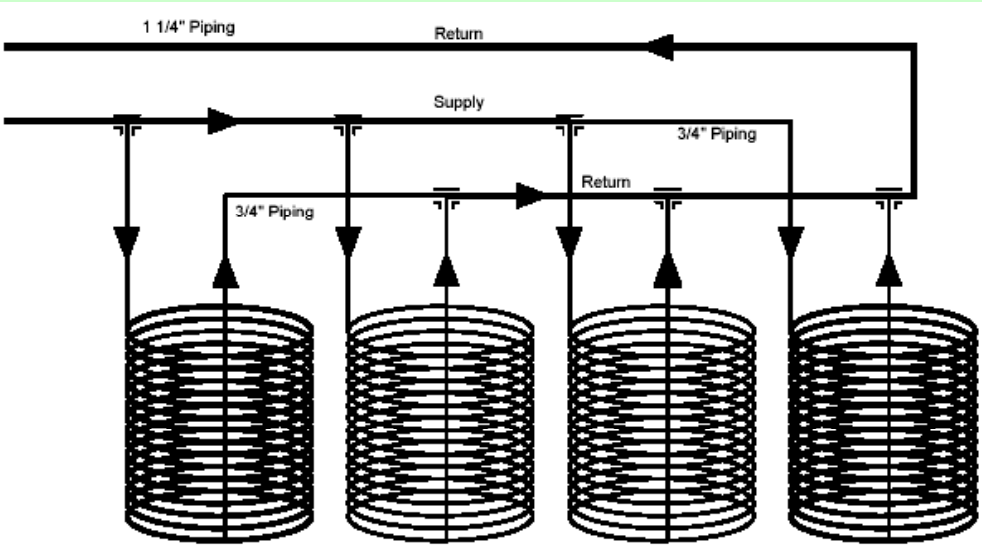
Excavation methods will vary depending on local conditions. Most situations will allow you to work with a 36" bucket. It is critical that the bottom of your trenches be as smooth as possible and be free from obstructions, which could damage your piping. This can be accomplished by using the back of the 36" excavator bucket to press and smooth the bottom of the trench.

In general, your loop field installation should look as follows:

Eagle Mountain Inc.
(800) 572-7831 (585) 229-2265 FAX: (585) 229-4585
www.eagle-mt.com

Header Trench

Slinky Trenches

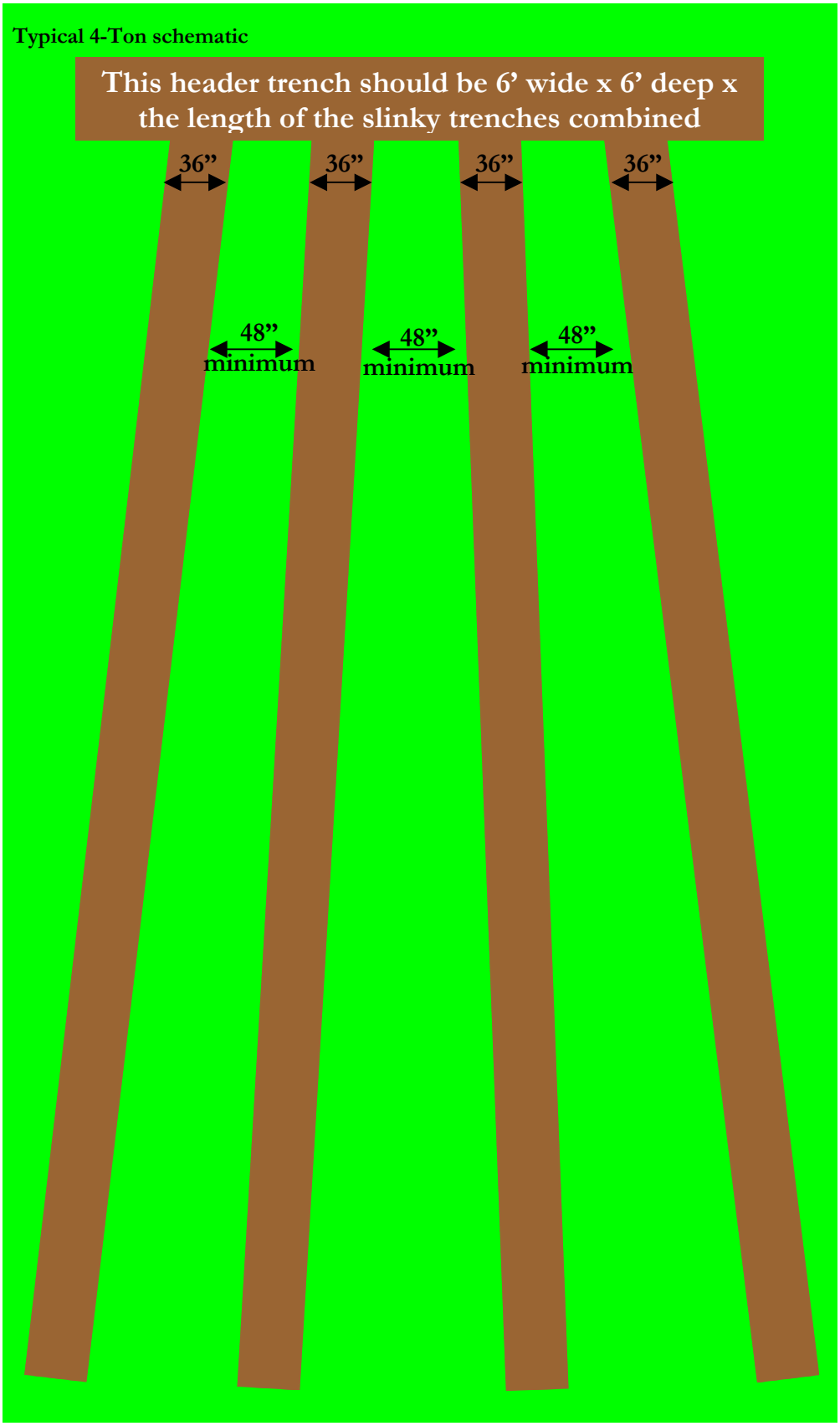


Header Trench: In general the header trench should be 6' wide x 6' deep by the length of all of your trenches and green buffer space combined. The header trench should also lead back to the building and to the exposed foundation wall to allow for your supply and return pipes. To penetrate the foundation wall we recommend (2) 3" PVC pipes with Fernco rubber couplings over the ends to adapt 3" PVC to 1 ¼" supply and return GEO tube. This allows for the supply and return piping to remain independent. This will also help prevent shearing of the GEO pipe as it passes across the fresh backfill from the new construction in the event of settling.

Slinky Trench: Each of the slinky trenches should be 3' wide x 6' deep x approximately 135' long. It is important that you allow for 4' of earth between each of the slinky trenches. This dimension can be reduced slightly at the header trench. An illustration of a general trench system can be seen below:

Eagle Mountain Inc.
(800) 572-7831 (585) 229-2265 FAX: (585) 229-4585
www.eagle-mt.com

Typical 4-Ton schematic



Eagle Mountain Inc.
(800) 572-7831 (585) 229-2265 FAX: (585) 229-4585
www.eagle-mt.com

Pipe Joining Methods (Fusion)

The only acceptable method for joining buried pipe systems is by a heat fusion process. Polyethylene pipe shall be socket fused in accordance with the manufacturer's procedures. Polybutylene pipe shall be socket fused in accordance with the manufacturer's procedures. Fused transition fittings with reinforced threads must be used to adapt copper or high strength hose connections to the circulating pump and heat pump inside your utility room. Barbed fittings are not permitted in the soil.

Heat Fusion: Heat fusion is the process by which the plastic pipe material is cut, cleaned, heated to their melting point, aligned and brought together to form a homogeneous material. The illustrations below will allow you to see this process:

Step 1: Release air from pressure testing (release the air in the slinky after backfilling)

Step 2: Cut the pipe

Step 3: Clean the pipe & fitting (using emery cloth or fitting brush)

Eagle Mountain Inc.
(800) 572-7831 (585) 229-2265 FAX: (585) 229-4585
www.eagle-mt.com

Step 4: Set gauge clamp on pipe using gauge cap to preset the depth of the pipe in the fitting.

Step 5: Heat to melting point. Check manufacturers spec for timing and temperature. Use melt sticks to verify temperature settings and temperature gauge.

Warning, due to high temperatures do not allow these surfaces to touch your skin or flammable surfaces.

Close up of fusion tool

Eagle Mountain Inc.
(800) 572-7831 (585) 229-2265 FAX: (585) 229-4585
www.eagle-mt.com

Step 6: Quickly align and bring together (hold for 30 seconds, full cure in 30 minutes)

Step 7: Pressure test: When all fusion is complete and fully cured, pressure test. Also check all fusion joints for leaks using a suitable leak detector solution.

Eagle Mountain Inc.
(800) 572-7831 (585) 229-2265 FAX: (585) 229-4585
www.eagle-mt.com

Pressure Testing

Once the coils have been built, they need to be pressure tested at the job site and keep them under pressure during the backfill process. This ensures there is no damage to the loop and that the system remains free of leaks.

All fusion joints must also be pressure tested prior to installation, but after allowing 30 minutes for all fusion to cure. This process should be done for a minimum of 30 minutes to ensure no leaks.

Testing pressures should be at a minimum constant pressure of 50 psi using air. This should begin prior to placing the slinky in the trench.

Slinky Placement

- **It is safest to make all connections outside the trench, above grade. When working in the trench or below grade it is critical that you follow all safe excavating guides and OSHA standards.**

The installation process begins by laying the slinky loop on the ground surface the entire length of the trench. One end of the loop is picked up and dropped in from the ground surface while a second individual further down the trench holds the loop over the trench. The two people can alternate moving down the trench while dropping the loop into the trench until the entire slinky is in the trench. A positioning tool should be used to shift the slinky in the trench to avoid working in the trench as much as possible. The ends of the slinkies should remain long enough to allow for the fusion to the header.

Header Pipe Placement

After the header pipe has been fused to the individual slinky loops, it should be gently placed into the header trench and the backfilled as described in the next section. Always monitor the pressure to ensure you are free of leaks.

Backfilling

Prior to backfilling your trench, be sure you have not had a loss in pressure which could indicate damaged material or a leak in the system.

Backfilling should begin by placing approximately one foot of clean soil, free from rocks, large clumps and other obstacles, which could damage your piping once, covered. Have someone monitor the fill as it is dumped form the excavator bucket

Eagle Mountain Inc.
(800) 572-7831 (585) 229-2265 FAX: (585) 229-4585
www.eagle-mt.com

and **stop filling should a rock or other objectionable material fall on the tube**. If this happens, safely remove the obstruction and continue. If the previously excavated soil is not clean enough and free from rocks and clumps you should use clean topsoil, limestone dust or other acceptable material to cover the tubing. This prevents damage and ensures there is good contact between the earth and the tubing allowing the best heat transfer. When possible water soak the first foot of backfill material. Once this has been done, finish the rest of the backfill operation.

Final Connections

Please read the manufacturers specifications for your geothermal heat exchanger to instructions on your final connections.

Technical Support

For technical support, contact Radiantmax at 800-572-7831.

Eagle Mountain Inc.
(800) 572-7831 (585) 229-2265 FAX: (585) 229-4585
www.eagle-mt.com