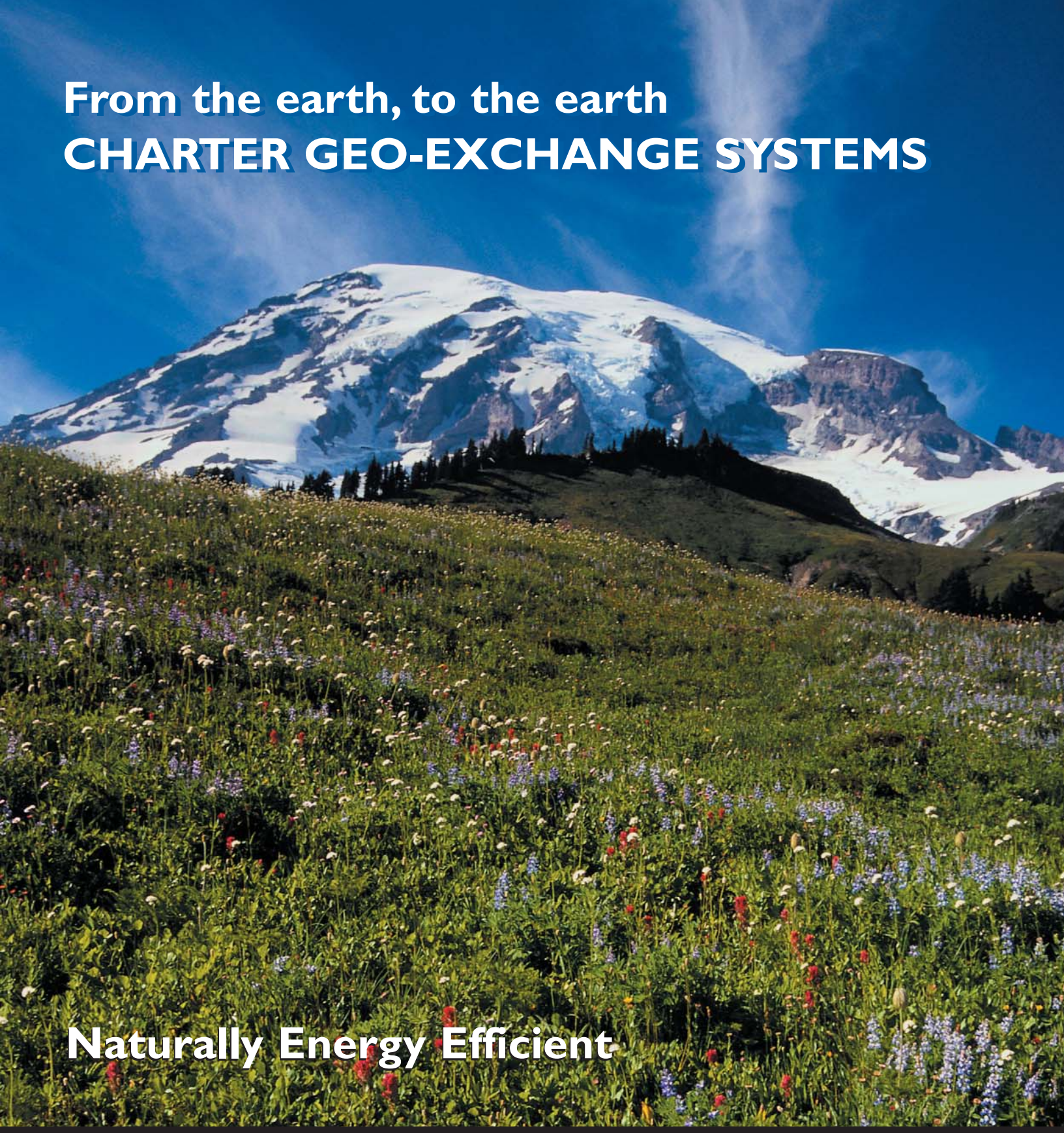
# From the earth, to the earth
# CHARTER GEO-EXCHANGE SYSTEMS



## Naturally Energy Efficient

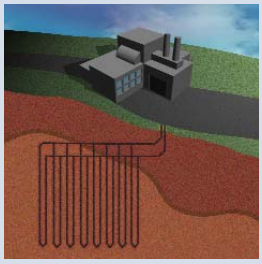
Charter Plastics
Polyethylene. Pipe. Partners.

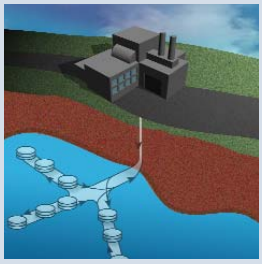
# Naturally Energy Efficient

## Charter Plastics – Your Partner in Geothermal Energy

Over the past 20 years, geothermal energy has quietly asserted itself as an environmentally efficient, cost effective, and virtually inexhaustible alternative to traditional heating and air conditioning systems. Charter Plastics has been part of this revolution right from the beginning. We make quality geo-exchange piping products for commercial and residential geothermal systems and, as a partner well-known for service to our customers, we want to help you realize the benefits of "geo-exchanging it" with Charter Plastics.

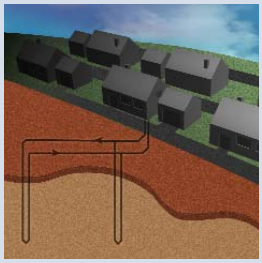
**Commercial Application**
*Series of vertical wells*

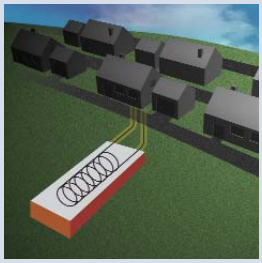




**Commercial Application**
*Surface water installation*

**Residential Application**
*Vertical wells*





**Residential Application**
*Slinky Configuration*

### CHARTER GEOTHERMAL ADVANTAGE

- **Abrasion resistance** *Good impact and abrasion resistance help Charter Geothermal pipe withstand the rigors of installation.*
- **Bendable** *Charter Geothermal pipe is flexible and can be cold bent to a radius of 15 times the nominal pipe diameter without breaking or kinking.*
- **Corrosion resistance** *Inert in most soil conditions, Charter pipe will not rust, rot, corrode or pit with age.*
- **Thermally conductive** *Charter's Geothermal pipe exhibits excellent heat transfer capabilities.*
- **Durable** *Extensive testing and long-term field performance have proven Charter Geothermal pipe's outstanding longevity.*
- **Leak Free** *Charter Geothermal pipe is heat fusible for permanent, leak free joints.*

### AN EFFICIENT, ENVIRONMENTALLY SENSIBLE SOLUTION

Geothermal exchange (geo-exchange) technology has been used for decades to heat and cool residential and commercial buildings. Most systems employ three major components:

- *a heat exchanger, constructed of a series of high-density polyethylene pipes, buried in the ground or submerged in a pond or lake*
- *a heat transfer medium such as water or an anti-freeze solution that carries heat through the system, and*
- *a geothermal heat pump*

Geo-exchange systems use the earth as a boundless thermal "bank", drawing heat or depositing it as required. This energy exchange helps to heat and cool buildings more efficiently.

What's more, geoexchange technology is field-proven in thousands of installations across the country. Whether you are upgrading an existing heating or cooling system, or installing a new one, a geothermal exchange system is an economically sensible and environmentally smart choice.

## SUPERIOR PIPE PERFORMANCE

The heat exchanger is a key component of any geothermal system. It must be made from a polyethylene pipe which is designed to meet the operating temperatures, working pressures and life expectancy of a geothermal system.

Charter Plastics Geothermal Pipe is specifically designed to meet these demands. Made from PE 3408 High Density Polyethylene resins listed in PPI TR4, it meets or exceeds all International Ground Source Heat Pump Association standards for geothermal heat exchangers and is engineered with the perfect balance of properties for long-term strength and performance.

## THE CHARTER QUALITY DIFFERENCE

### Permanent Printing

*Each coil of Charter Geothermal pipe is indent-printed for permanent identification.*

### Quality Control Code

*Included in each pipe's print line is a quality control code that provides a lasting reference to all information regarding the production of that particular coil.*

### Footage Markings

*Sequential footage markings are printed on the coils every two feet.*

### Pressurized with Sealed Ends

*Charter Geothermal coils and loops, from 3/4" through 2", are pressurized with 8 to 10 psi of air and have sealed ends. This unique feature keeps the pipe clean and helps maintain ovality during storage. When the pipe is cut on-site, you hear the air pressure being released. This is your assurance that your Charter Geothermal pipe is in perfect condition, ready to install.*

### Packaging

*Charter Geothermal pipe is available in coils, straight lengths or on mileage reels.*

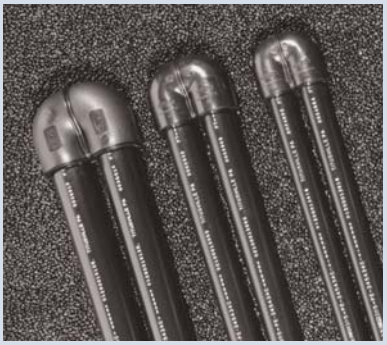
## POLYETHYLENE. PIPE. PARTNERS.

At Charter Plastics we believe in being more than a geothermal pipe supplier. We view you, our customer, as a partner in our pipe business.

This means taking the time to understand your needs. Having the technical knowledge and experience to provide you with creative solutions. Getting timely answers to your questions. Maintaining an extensive inventory of the highest-quality geothermal pipe and fittings, and providing you with industry-best lead times for custom geothermal loops.

## IT MEANS DELIVERING ON OUR PART OF THE PARTNERSHIP

Outstanding quality and service is not just something we talk about, it is who we are. Let us show you the difference between working with a geothermal pipe *supplier* and working with a ***partner*** in geothermal pipe. **Charter Plastics.** Call us.



### INSTALLATIONS MADE EASY

*Charter Plastics manufactures pre-made geothermal ground loops that greatly reduce time and labor during installation. Ideal for vertical bore applications, each loop is configured as a single coil comprised of a supply and a return pipe fused to a Charter U-bend (180°) fitting. The loops are ready for immediate installation when they reach the job site; no field fabrication is required. In addition, Charter Plastics can custom fabricate geothermal manifolds to meet your particular job specifications.*

Charter Plastics
Polyethylene. Pipe. Partners.

## PIPE JOINING

Permanent leak free joints are critical in a geothermal system. Therefore, Charter recommends joining our geothermal pipe with heat fusion only. Pipe installers should be certified in heat fusion and the fusion procedures published by Charter Plastics or by PPI in TN 13-2001 should be followed.

*Basic fusion recommendations are:*

- *3/4" – 1-1/4" pipe should be joined with socket fusion.*
- *1-1/2" and larger pipe should be joined with butt fusion.*
- *Saddle fusion can be used for fusing laterals on the supply and return pipes.*

Charter sells a complete line of butt, socket and sidewall fittings and fusion equipment.

## GENERAL GUIDELINES

When specifying pipe for a project, ensure that the total system working pressure and temperature requirements do not exceed the performance capabilities of the pipe and fittings.

Upon delivery, inspect the pipe for damage and verify that it meets all project specifications.

Site construction and installation of the pipe should follow IGSHPA guidelines and those set forth in PPI's *"Underground Installation of Polyolefin Piping"* as well as all federal, state and local regulations.

Require certification of individuals installing Geo-Exchange systems.

Prior to installation, carefully inspect the pipe for damage that may have occurred on the job site. Do not use the pipe if a cut or gouge is more than 10% of the minimum wall of the pipe.

When laying the pipe, ensure that the bottom of the ditch is smooth and free from rocks and debris.

Use a fine medium to back fill each trench. If there are multiple pipes in a trench, ensure that each pipe is completely surrounded and supported with backfill before the next pipe is installed.

When fusing pipe, conduct test fusions to verify the quality of the joints.

Hydrostatically test the pipe before installing. Hydrostatic testing should not exceed 150% of the pipe's pressure rating. Pneumatic testing is prohibited.

**Charter Plastics Inc.**
221 S. Perry Street, P.O. Box 770,
Titusville, PA 16354 USA
Phone: 1.800.486.7473
Fax: 1.800.229.3691
www.charterplastics.com