GEOTHERMAL
HDPE PRESSURE PIPE

BLUE DIAMOND
Industries, LLC

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Scope

Geothermal exchange is a clean energy method of heating and cooling commercial and residential buildings. The technology is proven and has been in use for decades. In simplest terms, HDPE (High Density Polyethylene) pipe is buried in the ground, allowing energy transfer between the fluid in the pipe and the earth. The fluid in the piping is warmed in the winter and cooled in the summer. The system consists of buried HDPE pipe, a heat pump, and air distribution system.The buried piping heat exchanger is a key component of the geothermal system.

IGSHPA recommends HDPE pipe for its superior properties.

- **CHEMICAL AND CORROSION RESISTANCE**-Will not corrode or rot, even in the most aggressive soil conditions
- **TOUGH AND FLEXIBLE**-Good impact and abrasion resistance
- **FLEXIBLE**-Can be bent to 1.5 times the outside diameter without kinking to follow the contours of the bore hole installation
- **THERMAL CONDUCTIVITY**-Excellent heat transfer properties
- **LEAK TIGHT JOINTS**-Fusion welded joints provide long term leak free joints

In the IGSHPA “Design and Installation Guide”, HDPE pipe materials are designated by PE 3608, PE 3408 and PE 4710. The first number is the ASTM D 3350 designation for the density of the resin. The second number designates the environmental stress crack resistance, a measure used to signify pipe performance and sometimes longevity. The last two numbers designate the Hydrostatic Design Stress, by which the pipes pressure rating is calculated.

Standard Put Ups

Blue Diamond manufactures Geothermal U-bend and standard coils in the following sizes. U-bend coils are typically supplied with 5 feet of extra piping on each of the supply and return loops to facilitate connection to the header.

COIL PIPE SIZE	U-BEND COILS	STANDARD COILS
3/4”	310’	300’
	410’	500’
	610’	600’
1”	310’	300’
	410’	400’
	610’	600’
1 1/4”	310’	300’
	410’	400’
	510’	500’
HEADER MATERIAL	**STICK LENGTHS**	
2”	20’/40’	
3”	20’/40’	
4”	20’/40’	
6”	20’/40’	

U-BENDS

BDI Geothermal Pipe Coils can be supplied with a U-Bend (180 degree elbow) installed at the manufacturing facility eliminating a field weld. These coils consist of the supply and return loop in parallel with the U-Bend welded at one end. U-Bend coils are typically supplied with 5 feet of extra piping on each supply and return loops to facilitate connection to the header. BDI pipe is also supplied in basic coil lengths or 20 foot sticks for custom applications. BDI U-Bends are marked to length at 2' intervals, with footages marked zero at the U-Bend and the total length at the end. Reverse U-Bends are also available for HDD (Horizontal Directional Drilling), where the U-Bend is located in the center of the coil.

JOINING

BDI Geothermal Pipe is manufactured according to ASTM D 3035 dimensions based on IPS (Iron Pipe Size) "outside diameter" dimensions. Heat fusion is the preferred method of joining lengths of pipe. Pipe installers should be certified in heat fusion of HDPE pipe. Refer to PPI TR 33, ASTM F2620 and IGSHPA guidelines for heat fusion joints. Piping above ground may be joined with mechanical fittings made to ASTM D 3035 standards.

INSTALLATION

Refer to IGSHPA Installation Manual for Geothermal Systems and PPI's "Handbook of Polyethylene Pipe" for guidelines on installation of pipe and grouting methods. After installation, but prior to backfilling, pipe should be flushed, purged and hydrostatically pressure tested to ensure there was no shipment or installation damage.

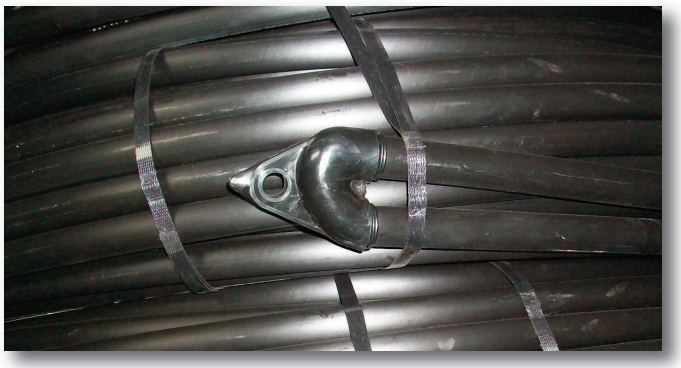
GENERAL GUIDELINES

- Calculate the total working pressure of the system and check it does not exceed the performance capabilities of the pipe and fittings. (*Pressure Class ratings listed are calculated at 73°. Operating temperatures above 73° will have lower pressure ratings. Call Blue Diamond Industries or consult the PPI "Handbook of Polyethylene Pipe" for Temperature Compensation Multipliers.)
- Inspect the pipe when delivered and prior to installation to detect any damage that might have occurred in shipment or handling.
- When installing in a trench, ensure the bedding and backfill is smooth and free from rocks and debris. Install pipe in accordance with IGSHPA guidelines and ASTM D 2774 - "Underground Installation of Thermoplastic Pressure Pipe." When installing in a bore hole, make sure any ballast used will not damage the piping.

Standard Coils

U-Bend Welder

U-Bend Coils



Materials and Standards

Blue Diamond is listed in the PPI (Plastic Pipe Institue) TR-4 listing for pressure pipes, under PE 4710 and PE 3608 type resins, which meet the requirements of IGSHPA standards. Blue Diamond PE 4710 is maufactured using a high performance bi-modal resin with superior stress crack resistance. PE 4710 pipe will have a higher pressure rating for the same SDR (wall dimension ratio), allowing the designer to consider a lighter more economical wall thickness. Additionally, because the wall thickness is less, an added benefit of increased water flow and better thermal conductivity are two other positive features. (See the BDI website for further technical information on the benefits of PE 4710 geothermal piping).

Blue Diamond Geothermal Pipe is maufactured to meet ASTM D 3035 and applicable IGSHPA standards. The PE 4710 resin has a cell class of PE445576C and the PE 3606 resin has a cell class of PE345464C in accordance with ASTM D3350. PE 4710 has HDS (Hydrostatic Design Stress) of 1000 psi (6.9 MPa) at 73 degrees F, and the corresponding HDS for PE 3608 is 800 psi (5.5 MPa). (See the Plastic Pipe Institute “Handbook of Polyethlyene Pipe”, Chapter 6 for more design information.

PE 3608/4710 *AT 73°F

PIPE SIZE	OUTSIDE DIAMETER		*DR 11 PE 3608 160- PSI PE 4710 200- PSI	*DR 13.5 PE 3608 128- PSI PE 4710 160- PSI	*DR 15.5 PE 3608 110- PSI PE 4710 135- PSI
3/4”	1.050”	MIN WALL	0.095”	.078”	.068”
		WT/100’	13.0lbs	11.0lbs	9.8lbs
1”	1.315”	MIN WALL	0.120”	.097”	.084”
		WT/100’	20.0lbs	16.9lbs	15.1lbs
1 1/4”	1.660”	MIN WALL	0.151”	.123”	.107”
		WT/100’	31.4lbs	26.4lbs	23.5lbs
2”	2.375”	MIN WALL	0.216”	.176”	.153”
		WT/100’	63.9lbs	53.1lbs	46.9lbs
3”	3.500”	MIN WALL	0.318”	.259”	.226”
		WT/100’	138.7lbs	115.3lbs	101.5”
4”	4.500”	MIN WALL	0.409”	.333”	.290”
		WT/100’	229.3lbs	190.6lbs	167.8lbs
6”	6.625”	MIN WALL	0.602”	.491”	.427”
		WT/100’	497.1lbs	413.0lbs	363.7lbs

Note: • Table values are within ASTM tolerances.

IGSHPA Accredited Installer

FOR MORE INFORMATION ON GEOTHERMAL PRESSURE PIPE CONTACT BLUE DIAMOND INDUSTRIES

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