



## GENERAL PRODUCT INFORMATION

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Earth Source Geothermal 3/4", 1" and 1-1/4" DR 9 and DR 11 piping are available in Earth Source Loops with U-bends that are pressurized and feature crimped ends. All resin used is HDPE-PE3608/PE3408 or PE4710 resin listed in PPI TR4 with a Cell Classification per ASTM D 3350 of 345464C for PE3608 or 445576C for PE4710. The materials have a Hydrostatic Design Basis of 1600 psi @ 73.4 degrees F. All Flying W Plastics' Earth Source Geothermal products meet or exceed the specifications set forth by IGSHPA, and are listed by NSF under their NSF Geothermal program. All piping is made to ASTM D3035 or ASTM F714 depending on size, and have sequential footage markings every two feet.

Flying W Plastics recommends joining Earth Source geothermal pipe by heat fusion. Use fusion procedures published by PPI in TN 13-2001 or Flying W Plastics. Flying W Plastics recommends inspecting all piping and fittings for damage prior to installation and hydrostatic testing of the completed installation prior to placing in service. Flying W Plastics recommends following IGSHPS Guidelines for installation and design.

- Available IPS pipe sizes: 3/4" to 18"
- 3/4"- to 6" available in coils or reels
- 3/4" to 18" available in straight lengths
- Piping available in DR 7 to DR 32.5, depending on size



Flying W Plastics, Inc. | 487 Vanhorn Dr. • PO Box 759 | Glenville, WV 26351  
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## SPECIAL FEATURES AND AVAILABILITY

### Dual-Wrapped Earth Source Geothermal Coils With Pre-Installed U-Bends

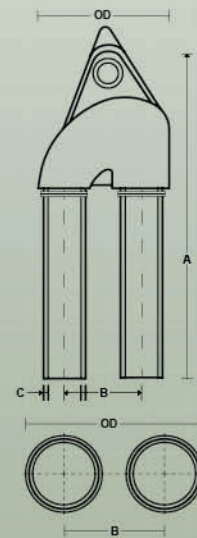
The fastest growing segment of Flying W Plastics' geothermal sales is for pre-fabricated dual-wrapped coils with a pre-installed U-bend. We fabricate the coils on-site using a DR 9 molded U-fitting.

Our Earth Source Geothermal dual-wrapped coils are made from premium HDPE materials, having a cell classification of 345464C for PE3608/3408, or 445576C for PE4710 as per ASTM D3350.

The piping is made to ASTM D3035 specifications, and has NSF-Geo-thermal listing. The coils are butt-fused together to a one-piece U-bend by trained and certified employees. The fitting is specially designed for geothermal well applications with a tapered "spear pointed" head for ease of installation.

Once fabricated and coiled, the coils are pressurized and the ends are crimped to prevent contamination during installation, and to reduce the fear of integrity loss during the transportation, handling and well insertion phases of the installation.

Nominal Size	O.D.	"A" Length	"B" Center Space	"C" Min. Wall	"C" Max. Wall
3/4" IPS	3.09"	per customer	1.75"	.095"	.115"
1" IPS	3.12"	per customer	1.82"	.120"	.140"
1-1/4" IPS	3.83"	per customer	1.91"	.151"	.171"



Flying W Plastics is a member of the IGSHPA, and all of our Earth Source Geothermal products fully comply with IGSHPA guidelines.

We use the same high quality NSF-Geo certified pipe as in the rest of our geothermal product line. The coils are available to ASTM D3035 specifications in 3/4", 1", & 1 1/4", with DR 11 and DR 9 piping.

We stock DR 11 dual-wrapped coils in many sizes and lengths. Coils using DR 9 piping and custom lengths normally have fast turnaround on special orders.

#### Applications

Commercial, institutional, and residential wells and other installations where a complete loop with a U-bend is needed.





## NORMALLY-STOCKED COILS

Flying W Plastics normally stocks both single-wrapped coils and dual-wrapped coils of our Earth Source Geothermal Pipe in a variety of sizes and lengths.

### SINGLE-WRAPPED COILS

Single-wrapped coils are capped and banded to skids, then shrink-wrapped. Our ¾" through 1¼" pipe can be furnished with crimped ends and pressurized on request.

<u>Size</u>	<u>Lengths Available</u>
¾" IPS	300', 400', 500', 600', 800'
1" IPS	300', 500'
1-1/4" IPS	150', 300', 500'
2" IPS	300', 500'



### DUAL-WRAPPED COILS WITH U-BENDS

Dual-wrapped coils are fitted with a one-piece molded DR 9 U-bend, then crimped and pressurized. They are banded to pallets and shrink-wrapped.



<u>Size</u>	<u>Total Coil Lengths Available</u>
¾" IPS	310', 410'
1" IPS	310', 410', 610'
1-1/4" IPS	610', 810', 1010'



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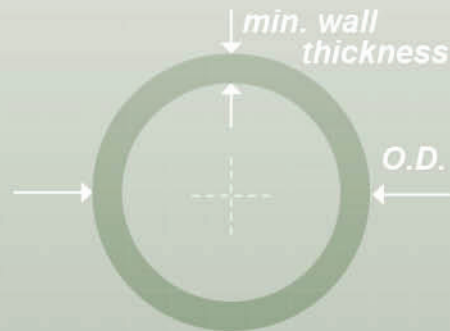




## STANDARD DIMENSION RATIO AVAILABILITY

### DR 9 250 PSI PE4710

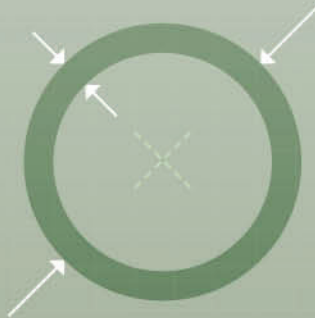
IPS Pipe Size	Nominal OD	Min. Wall	Avg. ID (in.)*	Weight lbs/ft
3/4"	1.050	.117	0.80	.15
1"	1.315	.146	1.01	.235
1-1/4"	1.660	.184	1.27	.374
1-1/2"	1.900	.211	1.45	.49
2"	2.375	.264	1.82	.766
3"	3.500	.398	2.68	1.66
4"	4.500	.500	3.44	2.75
6"	6.625	.736	5.06	5.96
8"	8.625	.958	6.59	10.10
10"	10.750	1.194	8.22	15.68
12"	12.750	1.417	9.75	22.06
14"	14.00	1.556	10.70	26.60
16"	16.00	1.778	12.23	34.74
18"	18.00	2.000	13.76	43.97



$$DR = O.D. / \text{min. wall thickness}$$

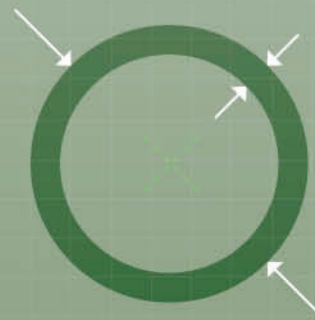
### DR 11 200 PSI PE4710

IPS Pipe Size	Nominal OD	Min. Wall	Avg. ID (in.)*	Weight lbs/ft
3/4"	1.050	.095	0.85	.125
1"	1.315	.120	1.06	.197
1-1/4"	1.660	.151	1.34	.313
1-1/2"	1.900	.173	1.53	.411
2"	2.375	.216	1.92	.642
3"	3.500	.318	2.83	1.39
4"	4.500	.409	3.63	2.30
6"	6.625	.602	5.35	4.99
8"	8.625	.784	6.96	8.46
10"	10.750	.977	8.68	13.14
12"	12.750	1.159	10.29	18.49
14"	14.00	1.273	11.30	22.29
16"	16.00	1.455	12.91	29.12
18"	18.00	1.636	14.53	36.85



### DR 15.5 138 PSI PE4710

IPS Pipe Size	Nominal OD	Min. Wall	Avg. ID (in.)*	Weight lbs/ft
3/4"	1.050	.068	0.91	.092
1"	1.315	.085	1.14	.144
1-1/4"	1.660	.107	1.43	.229
1-1/2"	1.900	.123	1.64	.30
2"	2.375	.153	2.05	.469
3"	3.500	.226	3.02	1.02
4"	4.500	.290	3.88	1.69
6"	6.625	.472	5.72	3.65
8"	8.625	.556	7.45	6.19
10"	10.750	.694	9.28	9.62
12"	12.750	.823	11.01	13.53
14"	14.00	.903	12.09	16.31
16"	16.00	1.032	13.81	21.30
18"	18.00	1.161	15.53	26.96



\* Avg. I.D.'s are calculated using nominal O.D.'s and minimum wall thicknesses plus 6%.

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## PE3608/3408 PRODUCT SPECS

Flying W Plastics certifies its Earth Source Geothermal Pipe to be manufactured from select PE3608/PE3408 high-density polyethylene copolymers (see typical properties below), and to meet specifications set forth in ASTM D-3035, ASTM D-3350 and ASTM F-714. This material meets all of the requirements of ASTM 1248-81A for type PE34 Class C Product. It has outstanding properties of a high hoop stress and a high level of environmental stress crack resistance.

<b>Typical Properties<sup>1</sup></b>	<b>English Values</b>	<b>SI Values</b>	<b>ASTM Method</b>
Density (Black)	-	0.955 g/cc	D 4883
Melt Index <sup>2</sup>	-	8.75 g/10 min.	D 1238
Tensile Strength			
@ Yield (2 in/min)	3300 psi	22.8 MPa	D 638
@ Break (2 in/min)	4500 psi	31.0 MPa	D 638
Elongation @ Break (2 in/min)	>800%	>800%	D 638
Flexural Modulus <sup>3</sup>	120,000 psi	827 MPa	D 790
Notched Izod Impact Strength	6 ft-lbf/in	0.32 kJ/m	D 256
Hardness (Shore D)	66	66	D 2240
Vicat Softening Point	259 °F	126 °C	D 1525
Brittleness Temperature	<-180 °F	<-118 °C	D 746
Hydrostatic Design Basis			
@ 23 °C	1600 psi	11.0 MPa	D 2837
@ 60 °C	800 psi	5.5 MPa	D 2837
Minimum Required Strength	-	8.0 MPa	ISO 9080
Environmental Stress Crack Resistance <sup>4</sup>	>2000 hrs	>2000 hrs	D 1693
Environmental Stress Crack Resistance <sup>5</sup>	>5000 hrs	>5000 hrs	D 1693
Pipe ring ESCR <sup>6</sup>	>5000 hrs	>5000 hrs	F 1248
Notch Tensile (PENT)	>100 hrs	>100 hrs	F 1473
Carbon Black Concentration	2.3%	2.3%	D 1603
Cell Classification	345464C	345464C	D 3350

<sup>1</sup>Typical properties will vary within specification limits

<sup>2</sup>190 degrees C/21,100g

<sup>3</sup>2% Secant-Method 1

<sup>4</sup>Condition B, 10%

<sup>5</sup>Condition C

<sup>6</sup>Two inch, IDR 19

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## PE4710 PRODUCT SPECS

Flying W Plastics certifies its PE4710 Earth Source Geothermal Pipe to be manufactured from select PE4710/PE100 high-density polyethylene copolymers (see typical properties below), and to meet specifications set forth in ASTM D-3035, ASTM D-3350 and ASTM F-714. This material has NSF 14 and AWWA C901 certifications, complies with ANSI/NSF Standard 61 health requirements, and is recognized by the Plastics Pipe Institute as having a pipe material designation code of PE4710 and PE100.

<b><u>Typical Properties<sup>1</sup></u></b>	<b><u>English Values</u></b>	<b><u>SI Values</u></b>	<b><u>ASTM Method</u></b>
Density (Black)	-	0.959 g/cc	D 4883
Melt Index <sup>2</sup>	-	8.0 g/10 min.	D 1238
Tensile Strength			
@ Yield (2 in/min)	3625 psi	25.0 MPa	D 638
@ Break (2 in/min)	5500 psi	38.0 Mpa	D 638
Elongation @ Break (2 in/min)	>600%	>600%	D 638
Flexural Modulus <sup>3</sup>	150,000 psi	1035 MPa	D 790
Notched Izod Impact Strength	9 ft-lbf/in	0.49 kj/m	D 256
Hardness (Shore D)	66	66	D 2240
Vicat Softening Point	259 °F	126 °C	D 1525
Brittleness Temperature	<-180 °F	<-118 °C	D 746
Hydrostatic Design Basis			
@ 23 °C	1600 psi	11.0 Mpa	D 2837
@ 60 °C	1000 psi	6.9 MPa	D 2837
Minimum Required Strength	-	100 MPa	ISO 9080
Environmental Stress Crack Resistance <sup>4</sup>	>5000 hrs	>5000 hrs	D 1693
Environmental Stress Crack Resistance <sup>5</sup>	>5000 hrs	>5000 hrs	D 1693
Pipe ring ESCR <sup>6</sup>	>5000 hrs	>5000 hrs	F 1248
Notch Tensile (PENT)	75,000 hrs	75,000 hrs	F 1473
Carbon Black Concentration	2.3%	2.3%	D 1603
Cell Classification	445574C	445574C	D 3350

<sup>1</sup>Typical properties will vary within specification limits

<sup>2</sup>190 degrees C/21,100g

<sup>3</sup>2% Secant-Method 1

<sup>4</sup>Condition B, 10%

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