

# VERSAPIPE® HD80 GEO



Certified to NSF/ANSI 358

**High Density Polyethylene IPS Pipe for Geothermal Applications**  
Manufactured from PE3408/3608, certified to NSF 358, ANSI/CSA C448 and CSA B137.1

## SCOPE

This technical data sheet designates the raw materials properties of the **VERSAPIPE® HD80 GEO** pipe for use in ground source heat pump exchanger applications. It describes the minimum requirements established by **Versaprofiles** for the design and manufacture of a pipe especially created for various closed-loop heat exchanger purposes, like vertical, horizontal and pond installations.

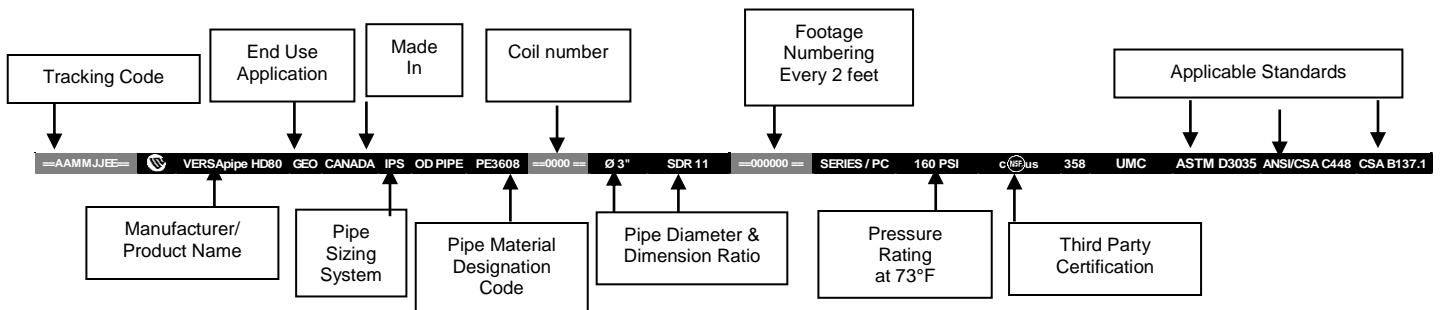
## RAW MATERIAL

All **VERSAPIPE® HD80 GEO** geothermal high density polyethylene pipes are manufactured from PE3408/3608 high density polyethylene resin meeting the cell classification 345464, or equivalent, as per ASTM D-3350. The raw material is filled with carbon black as an ultra violet inhibitor and can be stored outside. In addition, the raw material offers good protection against chemical products such as glycol and methanol.

(See the tables below for more information.)

## PRINTLINE

Versaprofiles **VERSAPIPE® HD80 GEO** pipe is identified with permanent marking and sequential footage numbering every two (2) feet.



## HANDLING, JOINING AND INSTALLATION

In order to assure the complete integrity of the piping system, do not drag or roll the **VERSAPIPE® HD80 GEO** pipe across rocks or rough ground. Installation and backfill practices for **VERSAPIPE® HD80 GEO** pipe in trenched, vertical bore or pond applications should comply with guidelines prepared by the International Ground Source Heat Pump Association (IGSHPA), Plastic Pipe Institute (PPI)<sup>1</sup>, and according to the installation recommendations found in ANSI/CSA C448 and CSA B137.1 standards. **VERSAPIPE® HD80 GEO** pipe is connected by heat fusions in accordance with ASTM F2620 and Plastic Pipe Institute (PPI)<sup>2</sup> recommendations. The fittings must be made with the same polyethylene used in the pipe. Before being buried, the loop should be tested using pressurized water at a maximum 150% of the nominal pressure related to the dimension ratio. This test should never be done using air or compressed gas.

1 : <http://plasticpipe.org/pdf/chapter12.pdf>  
2 : <http://plasticpipe.org/pdf/chapter09.pdf>

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**RAW MATERIAL PROPERTIES AND CELL CLASSIFICATION AS PER ASTM D3350**

Properties	Cell Classification (345464C)	ASTM Test Method	Typical Values	
			Imperial Units	SI Units
Density (natural)	3	D 792	-	0.945 g/cm <sup>3</sup>
Melt Index	4	D 1238	-	0.08 g/10min.
Flexural Modulus	5	D 790	125,000 psi	861 MPa
Tensile Strength at Yield	4	D 638	3,300 psi	22.7 MPa
Resistance to Slow Crack Growth of compound (SCG), hrs. (PENT)	6	F 1473	>100 h	>100 h
Hydrostatic Design Basis @ 73°F (23°C)	4	D 2837	1,600 psi	11.0 MPa
Carbon Black Concentration (by weight)	C	-	-	2%
Elongation at Break		D 638	> 800%	> 800%
IZOD Impact Strength, notched		D 256	> 11.0 pi-lb./po.	> 590 J/m
Brittleness Temperature		D 746	<-180°F	<-118°C
Environmental Stress Crack Resistance		D 1693 (C Condition)	>1,000 h	>1,000 h
Thermal conductivity			0.24 BTU/(hr pi° F)	0.42 W/(m° K)
Specific heat capacity			0.55 BTU/(lb °F)	2,300 J/(Kg° K)

**STANDARD PRODUCT SIZES AS PER ASTM D3035†**

Nominal Pipe Size, IN	Outside Diameter, IN (mm)	Tolerance, IN (mm)	SDR 15.5		SDR 13.5		SDR 11		SDR 9	
			Average Wall Thickness, IN (mm)	Weight for 100 Ft. PO (Kg)	Average Wall Thickness, IN (mm)	Weight for 100 Ft. PO (Kg)	Average Wall Thickness, IN (mm)	Weight for 100 Ft. PO (Kg)	Average Wall Thickness, IN (mm)	Weight for 100 Ft. PO (Kg)
¾	1.050	± 0.004	0.078*	9.85*	0.088*	10.99*	0.105	12.89	0.127	15.23
	(26.67)	(0.10)	(1.98)	(4.47)	(2.24)	(4.99)	(2.67)	(5.85)	(3.23)	(6.91)
1	1.315	± 0.005	0.094*	14.91*	0.107*	16.79*	0.130	20.02	0.156	23.49
	(33.40)	(0.13)	(2.39)	(6.77)	(2.72)	(7.62)	(3.30)	(9.08)	(3.96)	(10.66)
1 ¼	1.660	± 0.005	0.117*	23.46*	0.133*	26.39*	0.161	31.36	0.195	36.95
	(42.16)	(0.13)	(2.97)	(10.64)	(3.38)	(11.97)	(4.09)	(14.23)	(4.95)	(16.76)
1 ½	1.900	± 0.006	0.133*	30.54*	0.151*	34.32*	0.184	41.03	0.223	48.59
	(48.26)	(0.15)	(3.38)	(13.85)	(3.84)	(15.57)	(4.67)	(18.61)	(5.65)	(22.04)
2	2.375	± 0.006	0.163*	46.85*	0.187*	53.16*	0.229	63.85	0.280	76.22
	(60.31)	(0.15)	(4.14)	(21.25)	(4.75)	(24.11)	(5.82)	(28.96)	(7.11)	(34.57)
3	3.500	± 0.008	0.240	101.46	0.275	115.04	0.337	138.50	0.413	165.48
	(88.90)	(0.20)	(6.08)	(46.02)	(6.99)	(52.18)	(8.56)	(62.82)	(10.48)	(75.06)
4	4.500	± 0.009	0.308	167.51	0.353	190.21	0.434	227.39	0.530	273.39
	(114.30)	(0.23)	(7.81)	(75.98)	(8.97)	(86.28)	(11.01)	(103.14)	(13.46)	(124.01)
6	6.625	± 0.011	0.453*	362.91*	0.521*	412.84*	0.638*	492.12*	0.780*	592.37*
	(168.28)	(0.28)	(11.49)	(164.61)	(13.23)	(187.26)	(16.21)	(223.22)	(19.81)	(268.70)
8	8.625	± 0.013	0.590*	615.47*	0.678*	699.60*	0.831*	841.54*	1.016*	1004.04*
	(219.08)	(0.33)	(14.97)	(279.18)	(17.22)	(317.34)	(21.11)	(381.72)	(25.79)	(455.43)

† Ask your account manager about the availability of the displayed sizes. Versaprofiles may also offer options that are not listed in this document.  
\* Not NSF 358 certified

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**PRESSURE RATING**

Pipe Standard Diameter Ratio (SDR)	Standard Pressure Rating (PSIG @ 73°F (23°C))
21	80
17	100
15.5	110
13.5	125
11	160
9	200

**MINIMUM BENDING RADIUS**

Pipe Standard Diameter Ratio (SDR)	Minimum Long Term Cold Bending Radius
9 or less	20 X OD
11, 13.5	25 X OD
15.5, 17, 21	27 X OD

OD = Pipe outside diameter.

**TEMPERATURE COMPENSATING MULTIPLIER**

Maximum Pipe Sustained Temperature °F (°C)	Compensating Multiplier
-20 (-29)	2.54
-10 (-23)	2.36
0 (-18)	2.18
10 (-12)	2.00
20 (-7)	1.81
30 (-1)	1.65
40 (4)	1.49
50 (10)	1.32
60 (16)	1.18
73.4 (23)	1.00
80 (27)	0.93
90 (32)	0.82
100 (38)	0.73
110 (43)	0.64
120 (49)	0.58
130 (54)	0.50
140 (60)	0.43

**THERMAL EXPANSION CALCULATION**

$$\Delta L = L \alpha \Delta T$$

**Where**

$\Delta L$  = pipeline length variation, ft  
 $L$  = pipe length, ft  
 $\alpha$  =  $10^{-6}$  67 (thermal expansion coefficient, in/in/°F)  
 $\Delta T$  = temperature variation, °F

**FLUID VOLUME CALCULATION**

$$V = \pi r^2 L$$

**Where**

$V$  = volume, ft<sup>3</sup> (m<sup>3</sup>)  
 $\pi$  = 3.1416...  
 $r$  = pipe inside radius (ID/2), ft (m)  
 $L$  = pipe length, ft (m)

**Note:** For weight calculation,  $W = V D$

**Where**

$W$  = weight, lb  
 $V$  = calculated volume, ft<sup>3</sup>  
 $D$  = fluid density, lb/ft<sup>3</sup>

**References :**

- ASTM Standards D3035, D3350 and F2620
- CSA B137.1 and ANSI/CSA C448 standards
- Plastic Pipe Institute (PPI), [http://plasticpipe.org/publications/pe\\_handbook.html](http://plasticpipe.org/publications/pe_handbook.html)



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