



# Material and Technical Data Sheet

## CenFuse HDPE Polyethylene Pipe

**Material:** All CenFuse HDPE is manufactured from virgin high density polyethylene resin with the cell classification of 345464C per ASTM D 3350. The material contains a minimum 2% Carbon Black as a UV inhibitor to accommodate outside storage.

**Print Line:** All CenFuse HDPE is indent printed with white print stating the following:

1. Identification of Centennial Plastics as the manufacturer.
2. The appropriate SDR and IPS designation and nominal diameter.
3. Product trade name.
4. All relevant ASTM standards to which CenFuse is manufactured.
5. Relevant NSF and AWWA standards.
6. Manufacturing date using the Julian calendar.
7. Incremental footage marking every two feet.
8. Design temperature rating.
9. Production shift designation.
10. Identification of PE 3408 high density resin.

**Recommended Usage:** CenFuse HDPE is recommended for use as the piping material for buried or submerged closed loop heat exchangers.

**Connections:** CenFuse HDPE is manufactured to accommodate heat fusion.

Centennial Plastics pre fabricates dual coils with the "Bullet" U-Bend fitting.

The "Bullet" U-Bend fitting and CenFuse HDPE are manufactured with identical raw materials, allowing for the entire buried heat exchange system to be constructed from the same resin.

It is recommended that closed loop applications requiring a dual coil, use Centennial Plastics "Bullet" U-Bend fitting. CenFuse is compatible with the normal butt and socket fusion fittings currently in use in the Geo Thermal industry.

Fluid Capacity per 100'		
Diameter	SDR	Gallons
3/4"	SDR 11	3.02
1"	SDR 11	4.73
1 1/4"	SDR 11	7.55
1 1/2"	SDR 11	9.93
2"	SDR 11	15.36
3"	SDR 11	33.47
4"	SDR 11	55.31
6"	SDR 11	119.9

Hydrostatic Design	
Temperature	Hydrostatic Design Basis
73.4 <sup>0</sup> F. (23 <sup>0</sup> C.)	1600 PSI
140 <sup>0</sup> F. (60 <sup>0</sup> C.)	800 PSI

As the temperature of the fluid increases above 73.4° F, the pressure carrying capacity of HDPE pipe decreases.

73° F.	80° F.	90° F.	100° F.	110° F.	120° F.	130° F.
Pressure Capacity in PSI						
80	76	72	64	60	56	40
100	95	90	80	75	70	50
125	118	112	100	93	87	62
160	152	144	128	120	112	80
200	190	180	160	150	140	100

CenFuse HDPE for use in Geothermal, ground source heat pump applications.

ASTM Standards that CenFuse HDPE Meets or Exceeds:

D 3035...Standard Specification for Polyethylene (PE) Plastic Pipe (DR-PR)  
Based on Controlled Outside Diameter.  
D 3350...Standard Specification for Polyethylene Plastic Pipe and  
Fittings Material.

#### CenFuse HDPE Raw Material Properties

Property	ASTM Test Method	Typical Values	
		English Units	SI Units
Density (Natural)	D 4883	-	0.944 g/cc
Density (Black)		-	0.955 g/cc
Melt Index <sup>1</sup>	D 1238	-	12.5 g/10 min
Tensile Strength			
@ Yield (2 in/min)	D 638	3300 psi	22.8 MPa
@ Break (2 in/min)	D 638	4500 psi	31.0 MPa
Elongation			
@ Break (2 in/min)	D 638	>800%	>800%
Flexural Modulus <sup>2</sup>	D 790	120,000 psi	827 MPa
Notched Izod Impact Strength	D 256	6.0 ft-lbf/in	0.32 kJ/m
Hardness (Shore D)	D 2240	68	68
Vicat Softening Point	D 1525	259° F	126° C
Brittleness Temperature	D 746	<-180° F	<-118° C
Hydrostatic Design Basis			
@ 23° C	D 2837	1600 psi	11.0 MPa
@ 60° C	D 2837	800 psi	5.5 MPa
Environmental Stress Crack Resistance <sup>3</sup>	D 1693	>5000 hrs.	>5000 hrs.
Notch Tensile (Pent)	F 1473	>100 hrs.	>100 hrs.
Carbon Black Concentration	D 1603	2.30%	2.30%
Cell Classification	D 3350	345464C	345464C

<sup>1</sup> 190°C/21600 g

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

<sup>3</sup> Condition C



CenFuse is certified by NSF.  
CenFuse meets AWWA C901 and C906 Requirements.  
CenFuse HDPE is certified by NSF Standards 14 and 61.

Listed April, 2002; Updated June, 2005

**Hazen-Williams Head Loss and Flow Velocity for SDR 11 CenFuse HDPE**

	<b>Flow (US GPM)</b>	<b>Velocity (FPS)</b>	<b>Head Loss (FT/100')</b>
3/4" IPS	1	0.57	0.22
3/4" IPS	2	1.14	0.79
3/4" IPS	3	1.70	1.68
3/4" IPS	4	2.27	2.86
3/4" IPS	5	2.84	4.32
3/4" IPS	6	3.41	6.05
3/4" IPS	7	3.98	8.06
3/4" IPS	8	4.54	10.32
3/4" IPS	9	5.11	12.83
3/4" IPS	10	5.68	15.59
3/4" IPS	15	8.52	33.04

1" IPS	1	0.36	0.07
1" IPS	2	0.72	0.26
1" IPS	3	1.09	0.56
1" IPS	4	1.45	0.96
1" IPS	5	1.81	1.45
1" IPS	10	3.62	5.22
1" IPS	15	5.43	11.06
1" IPS	20	7.24	18.84
1" IPS	30	10.87	39.91
1" IPS	50	18.11	102.79

1 1/4" IPS	5	1.14	0.47
1 1/4" IPS	10	2.28	1.68
1 1/4" IPS	15	3.41	3.57
1 1/4" IPS	20	4.55	6.08
1 1/4" IPS	25	5.69	9.19
1 1/4" IPS	30	6.83	12.88
1 1/4" IPS	35	7.96	17.13
1 1/4" IPS	40	9.10	21.94
1 1/4" IPS	45	10.24	27.28
1 1/4" IPS	50	11.38	33.16

1 1/2" IPS	5	0.87	0.24
1 1/2" IPS	10	1.74	0.87
1 1/2" IPS	15	2.60	1.85
1 1/2" IPS	20	3.47	3.15
1 1/2" IPS	30	5.21	6.67
1 1/2" IPS	40	6.94	11.36
1 1/2" IPS	50	8.68	17.18
1 1/2" IPS	60	10.42	24.08
1 1/2" IPS	70	12.15	32.03
1 1/2" IPS	80	13.89	41.02

**Hazen-Williams Head Loss and Flow Velocity for SDR 11 CenFuse HDPE**

	<b>Flow (US GPM)</b>	<b>Velocity (FPS)</b>	<b>Head Loss (FT/100')</b>
<b>2" IPS</b>	<b>10</b>	<b>1.11</b>	<b>0.29</b>
<b>2" IPS</b>	<b>15</b>	<b>1.67</b>	<b>0.62</b>
<b>2" IPS</b>	<b>20</b>	<b>2.22</b>	<b>1.06</b>
<b>2" IPS</b>	<b>30</b>	<b>3.33</b>	<b>2.25</b>
<b>2" IPS</b>	<b>40</b>	<b>4.45</b>	<b>3.84</b>
<b>2" IPS</b>	<b>50</b>	<b>5.56</b>	<b>5.81</b>
<b>2" IPS</b>	<b>75</b>	<b>8.34</b>	<b>12.31</b>
<b>2" IPS</b>	<b>100</b>	<b>11.12</b>	<b>20.96</b>
<b>2" IPS</b>	<b>125</b>	<b>13.89</b>	<b>31.69</b>
<b>2" IPS</b>	<b>150</b>	<b>16.67</b>	<b>44.42</b>

<b>3" IPS</b>	<b>25</b>	<b>1.28</b>	<b>0.24</b>
<b>3" IPS</b>	<b>50</b>	<b>2.56</b>	<b>0.88</b>
<b>3" IPS</b>	<b>75</b>	<b>3.84</b>	<b>1.87</b>
<b>3" IPS</b>	<b>100</b>	<b>5.12</b>	<b>3.18</b>
<b>3" IPS</b>	<b>125</b>	<b>6.40</b>	<b>4.80</b>
<b>3" IPS</b>	<b>150</b>	<b>7.68</b>	<b>6.73</b>
<b>3" IPS</b>	<b>175</b>	<b>8.96</b>	<b>8.96</b>
<b>3" IPS</b>	<b>200</b>	<b>10.24</b>	<b>11.47</b>
<b>3" IPS</b>	<b>250</b>	<b>12.80</b>	<b>17.34</b>
<b>3" IPS</b>	<b>300</b>	<b>15.36</b>	<b>24.31</b>

<b>4" IPS</b>	<b>50</b>	<b>1.55</b>	<b>0.26</b>
<b>4" IPS</b>	<b>75</b>	<b>2.32</b>	<b>0.55</b>
<b>4" IPS</b>	<b>100</b>	<b>3.10</b>	<b>0.93</b>
<b>4" IPS</b>	<b>125</b>	<b>3.87</b>	<b>1.41</b>
<b>4" IPS</b>	<b>150</b>	<b>4.64</b>	<b>1.98</b>
<b>4" IPS</b>	<b>175</b>	<b>5.42</b>	<b>2.63</b>
<b>4" IPS</b>	<b>200</b>	<b>6.19</b>	<b>3.37</b>
<b>4" IPS</b>	<b>250</b>	<b>7.74</b>	<b>5.10</b>
<b>4" IPS</b>	<b>300</b>	<b>9.29</b>	<b>7.15</b>
<b>4" IPS</b>	<b>350</b>	<b>10.83</b>	<b>9.51</b>

<b>6" IPS</b>	<b>100</b>	<b>1.43</b>	<b>0.14</b>
<b>6" IPS</b>	<b>150</b>	<b>2.14</b>	<b>0.30</b>
<b>6" IPS</b>	<b>200</b>	<b>2.86</b>	<b>0.51</b>
<b>6" IPS</b>	<b>250</b>	<b>3.57</b>	<b>0.78</b>
<b>6" IPS</b>	<b>300</b>	<b>4.28</b>	<b>1.09</b>
<b>6" IPS</b>	<b>350</b>	<b>5.00</b>	<b>1.45</b>
<b>6" IPS</b>	<b>400</b>	<b>5.71</b>	<b>1.86</b>
<b>6" IPS</b>	<b>500</b>	<b>7.14</b>	<b>2.81</b>
<b>6" IPS</b>	<b>600</b>	<b>8.57</b>	<b>3.93</b>
<b>6" IPS</b>	<b>700</b>	<b>10.00</b>	<b>5.23</b>