Polyethylene Pipe Systems

**Advantages**

Pipe made from polyethylene is a cost-effective solution to a broad range of piping problems in municipal, industrial, marine, mining, and agricultural applications. It has proven itself in applications that encompass the transport of gases, hot and cold liquids, wastes and slurries, over land, under water and under ground. This versatility of polyethylene pipe arises out of a unique combination of features.

**Outstanding Chemical Resistance**

There are no commonly available materials that offer better over-all resistance to corrosive acids, bases and salts. In addition, polyethylene is unaffected by bacteria, fungi and by even the most ‘aggressive’ naturally occurring soils. It has good resistance to many substances, such as solvents and fuels.

**Non-Contaminating**

The purity of the fluids being conveyed is safe-guarded by the absence of any metallic or other easily extractable substances in the pipe material. Most polyethylene pipe material has been evaluated and listed as approved by the National Sanitation Foundation for the transport of potable water.

**Excellent Hydraulics**

Polyethylene pipe, which behaves as an ideally smooth conduit, offers the lowest possible resistance to the flow of fluids. Its superior chemical resistance and non-stick surface precludes scouring and pitting, thereby preserving its excellent flow characteristics throughout the pipe service life.

**Flexibility and Toughness**

Even in cold weather, polyethylene pipe is quite tolerant to handling, including bending. This facilitates installation and reduces costs and requirements for heavy equipment.

**Light Weight**

Made from material \( \frac{1}{8} \) the density of steel, polyethylene pipe is easily handled.

**Abrasion Resistance**

Extensive experience in mining and similar applications have demonstrated that polyethylene pipe out lasts more traditional pipe when conveying many types of abrasive slurries.

**Heat Fusibility**

Long lengths of pipe may quickly and economically be joined by heat fusion. This technique produces a monolithic joint that is as strong and chemically resistant as the pipe itself.

Polyethylene pipe excels in the following applications:

- Potable water
- Corrosive chemical lines
- Fresh water
- Aeration lines
- Waste water
- Chilled water lines
- Force mains
- Drainage lines
- Sewer rehabilitation
- Sewer lines
- Chemical lines
- Gas lines
- Slurry lines
- Temporary water lines
- Irrigation
- Fire loop and protection
- Fly ash lines
- River crossings
- Sludge lines
- Outfalls
- Cooling water lines
- Service lines
- Landfills
- Irrigation
- Fly ash lines
- Sludge lines
- Cooling water lines
- Landfills

**NOTE:**

When assembling HDPE fusion pipe you have to take into account thermal expansion and contraction.

**SHORT SPEC:**
Polyethylene pipe shall be made from high density, extra high molecular weight compound equaling a PÉ 3408 designation and shall conform to ASTM-1248 and ASTM-3350; with a cell classification of 345434C.
Sizes and Pressure Ratings

Polyethylene pipe products are manufactured with a controlled outside diameter and wall thickness. Outside diameters are generally the same as steel pipe. (See page A-27 for SDR numbers and corresponding pressure ratings.)

Joining:

EHMW® PE 3408 high density polyethylene pipe (HDPE) and fittings may be joined by the heat fusion process which produces homogeneous, sealed, leak-tight joints. In the field, a pipe system of HDPE polyethylene provides ease of construction, and consistent fusion joining under adverse job site conditions. E.J. Prescott can assist you with your heat fusion needs including equipment purchase or rental.

Installation:

The HDPE 3408 piping system may be directly buried, slippined in a casing, submerged, laid on the surface, or suspended. Polyethylene pipe should be encapsulated in a uniform grade of quality compacted fill material. Compaction of 85% proctor density or greater will enable higher surface load and limit deflection.

Types of HDPE 3408 Pipe

- **HTPE** - High-temperature polyethylene designed for use in high temperature environments.
- **Blue-Stripe** - Made and tested to the requirements of NSF standards.
- **Red-Stripe** - Made and tested to the requirements of Factory Mutual standards.
- **Blue-Stripe AWWA C906 Pipe** - Meets all requirements of AWWA.†
- **Yellow-Stripe** - Used to transport natural gas.

The APWA/ULCC has established the following code:

- **RED** - Electric Power Lines, Cables, Conduit and Lighting cables

(Continued on top of next column)

<table>
<thead>
<tr>
<th>PIPE SIZE</th>
<th>SDR</th>
<th>IPS SIZE</th>
<th>DI SIZE</th>
</tr>
</thead>
<tbody>
<tr>
<td>4&quot;</td>
<td>11</td>
<td>22089</td>
<td>22089 1</td>
</tr>
<tr>
<td>6&quot;</td>
<td>11</td>
<td>22129</td>
<td>22129 1</td>
</tr>
<tr>
<td>8&quot;</td>
<td>11</td>
<td>22167 5</td>
<td>22167 6</td>
</tr>
<tr>
<td>10&quot;</td>
<td>11</td>
<td>22184 5</td>
<td>22184 6</td>
</tr>
<tr>
<td>12&quot;</td>
<td>11</td>
<td>22229</td>
<td>22229 1</td>
</tr>
</tbody>
</table>

NOTE: 3" and 14" thru 24" sizes are special order.
### NOTES:
- Additional SDR’s and pressure ratings available, including sizes through 54”.
- See Section B for Polyethylene Pipe Fittings.
- Industrial PE (polyethylene) pipe sizes are identified by IPS (steel pipe size) diameters which designate the nominal inside diameter for 12” IPS AND SMALLER PIPE, AND O.D. (outside diameter) for 14” IPS and larger pipe.
- The ID on IPS PE 3408 can be significantly smaller than the nominal pipe size.
- Coefficient of thermal expansion is over 10 times that of DI and steel and 3 times that of PVC. In practical terms, this means HDPE pipe shrinks 10 times as much as DI and 3 times as much as PVC when it gets cold. This can loosen any fittings installed on it. Also, it’s length shrinks 1 inch per 100 feet of pipe length with a 10°F temperature drop, making it likely to pull out of unrestrained couplings.

### PRESSURE RATING

<table>
<thead>
<tr>
<th>IPS PIPE SIZE (IN)</th>
<th>O.D. AVG. ID (IN)</th>
<th>WEIGHT LB/FT</th>
<th>MIN. WALL AVG. ID (IN)</th>
<th>WEIGHT LB/FT</th>
<th>MIN. WALL AVG. ID (IN)</th>
<th>WEIGHT LB/FT</th>
<th>MIN. WALL AVG. ID (IN)</th>
<th>WEIGHT LB/FT</th>
<th>MIN. WALL AVG. ID (IN)</th>
<th>WEIGHT LB/FT</th>
<th>MIN. WALL AVG. ID (IN)</th>
<th>WEIGHT LB/FT</th>
</tr>
</thead>
<tbody>
<tr>
<td>2”</td>
<td>2.375</td>
<td>325</td>
<td>.91</td>
<td>.76</td>
<td>216</td>
<td>.64</td>
<td>—</td>
<td>—</td>
<td>—</td>
<td>—</td>
<td>—</td>
<td>—</td>
</tr>
<tr>
<td>3”</td>
<td>3.500</td>
<td>479</td>
<td>2.485</td>
<td>1.98</td>
<td>389</td>
<td>2.675</td>
<td>1.65</td>
<td>1.39</td>
<td>259</td>
<td>2.951</td>
<td>1.15</td>
<td>206</td>
</tr>
<tr>
<td>4”</td>
<td>4.500</td>
<td>616</td>
<td>3.194</td>
<td>3.27</td>
<td>500</td>
<td>3.440</td>
<td>2.74</td>
<td>2.30</td>
<td>333</td>
<td>3.794</td>
<td>1.90</td>
<td>265</td>
</tr>
<tr>
<td>5”</td>
<td>5.563</td>
<td>762</td>
<td>3.948</td>
<td>5.00</td>
<td>603</td>
<td>4.253</td>
<td>4.18</td>
<td>3.50</td>
<td>412</td>
<td>4.690</td>
<td>2.91</td>
<td>327</td>
</tr>
<tr>
<td>6”</td>
<td>6.625</td>
<td>908</td>
<td>4.700</td>
<td>7.09</td>
<td>736</td>
<td>5.065</td>
<td>5.93</td>
<td>4.97</td>
<td>491</td>
<td>5.584</td>
<td>4.13</td>
<td>390</td>
</tr>
<tr>
<td>7”</td>
<td>7.125</td>
<td>—</td>
<td>—</td>
<td>—</td>
<td>—</td>
<td>—</td>
<td>—</td>
<td>—</td>
<td>—</td>
<td>—</td>
<td>—</td>
<td>—</td>
</tr>
<tr>
<td>8”</td>
<td>8.625</td>
<td>1.182</td>
<td>6.119</td>
<td>12.01</td>
<td>958</td>
<td>6.594</td>
<td>10.05</td>
<td>8.43</td>
<td>639</td>
<td>7.270</td>
<td>7.00</td>
<td>598</td>
</tr>
<tr>
<td>10”</td>
<td>10.75</td>
<td>1.473</td>
<td>7.627</td>
<td>18.66</td>
<td>1.194</td>
<td>8.219</td>
<td>15.62</td>
<td>13.10</td>
<td>797</td>
<td>9.062</td>
<td>10.89</td>
<td>633</td>
</tr>
<tr>
<td>14”</td>
<td>14.00</td>
<td>1.918</td>
<td>10.701</td>
<td>31.64</td>
<td>1.556</td>
<td>10.701</td>
<td>26.49</td>
<td>22.20</td>
<td>1.037</td>
<td>11.802</td>
<td>18.44</td>
<td>824</td>
</tr>
<tr>
<td>16”</td>
<td>16.00</td>
<td>2.192</td>
<td>11.353</td>
<td>41.34</td>
<td>1.778</td>
<td>12.231</td>
<td>34.61</td>
<td>29.00</td>
<td>1.185</td>
<td>13.488</td>
<td>24.09</td>
<td>941</td>
</tr>
<tr>
<td>18”</td>
<td>18.00</td>
<td>2.466</td>
<td>12.772</td>
<td>52.31</td>
<td>2.000</td>
<td>13.760</td>
<td>43.79</td>
<td>36.69</td>
<td>1.333</td>
<td>15.174</td>
<td>30.48</td>
<td>1059</td>
</tr>
<tr>
<td>20”</td>
<td>20.00</td>
<td>2.740</td>
<td>14.191</td>
<td>64.57</td>
<td>2.222</td>
<td>15.289</td>
<td>54.05</td>
<td>45.30</td>
<td>1.481</td>
<td>16.860</td>
<td>37.64</td>
<td>1176</td>
</tr>
<tr>
<td>22”</td>
<td>22.00</td>
<td>—</td>
<td>—</td>
<td>—</td>
<td>—</td>
<td>—</td>
<td>—</td>
<td>—</td>
<td>—</td>
<td>—</td>
<td>—</td>
<td>—</td>
</tr>
<tr>
<td>24”</td>
<td>24.00</td>
<td>—</td>
<td>—</td>
<td>—</td>
<td>—</td>
<td>—</td>
<td>—</td>
<td>—</td>
<td>—</td>
<td>—</td>
<td>—</td>
<td>—</td>
</tr>
<tr>
<td>26”</td>
<td>26.00</td>
<td>2.889</td>
<td>19.875</td>
<td>—</td>
<td>—</td>
<td>—</td>
<td>—</td>
<td>76.58</td>
<td>1.926</td>
<td>21.917</td>
<td>63.63</td>
<td>1529</td>
</tr>
<tr>
<td>28”</td>
<td>28.00</td>
<td>2.545</td>
<td>22.605</td>
<td>88.79</td>
<td>2.074</td>
<td>23.603</td>
<td>73.76</td>
<td>1.647</td>
<td>25.508</td>
<td>79.68</td>
<td>59.62</td>
<td>962</td>
</tr>
<tr>
<td>30”</td>
<td>30.00</td>
<td>2.727</td>
<td>24.219</td>
<td>101.94</td>
<td>2.222</td>
<td>25.269</td>
<td>84.68</td>
<td>1.765</td>
<td>26.528</td>
<td>86.48</td>
<td>68.45</td>
<td>923</td>
</tr>
<tr>
<td>32”</td>
<td>32.00</td>
<td>2.909</td>
<td>25.833</td>
<td>115.99</td>
<td>2.370</td>
<td>26.976</td>
<td>96.35</td>
<td>1.882</td>
<td>28.010</td>
<td>77.86</td>
<td>78.65</td>
<td>985</td>
</tr>
<tr>
<td>34”</td>
<td>34.00</td>
<td>3.091</td>
<td>27.450</td>
<td>130.92</td>
<td>2.519</td>
<td>28.660</td>
<td>108.80</td>
<td>2.000</td>
<td>29.760</td>
<td>87.91</td>
<td>1046</td>
<td>31782</td>
</tr>
<tr>
<td>36”</td>
<td>36.00</td>
<td>3.274</td>
<td>29.075</td>
<td>151.86</td>
<td>2.652</td>
<td>30.440</td>
<td>120.80</td>
<td>2.118</td>
<td>31.310</td>
<td>98.56</td>
<td>1308</td>
<td>33651</td>
</tr>
</tbody>
</table>

†Subject to minimum order quantities and availability of tooling.

Phone: 800-EJP-24HR (357-2447)
Fax: 207-582-5637

www.ejprescott.com A-27
Polyethylene Ductile Iron O.D. Potable Water Pipe

In addition to the many benefits High Density Polyethylene Pipe (HDPE 3408) has to offer, (see below) it is now made with the same outside diameter as Ductile Iron pipe. Bluestripe AWWA C906 Polyethylene Pipe with its Ductile Iron O.D. can easily be connected to other types of pipe found in potable water systems using standard waterworks products.

Lower Life Cycle Costs

Bluestripe Polyethylene Pipe provides these tangible life cycle cost benefits:

- Corrosion Resistant (Electrolytic & Galvanic)—does not rust, rot or corrode and resists chemical attacks from aggressive soils.
- Leak Tight—heat fused joints create a homogenous, monolithic system. The fusion joint is as strong as the pipe.
- Maintains optimum flow rates—Hazen-Williams C Factor remains constant due to high resistance to scale or biological buildup.
- Excellent Water Hammer Characteristics—significantly lower surges than PVC or Ductile Iron.
- High strain allowance virtually eliminates breakage due to freezing pipes.

Reduced Installation Costs

Bluestripe Polyethylene Pipe provides installation benefits that help contractors and owners realize significant cost reductions compared to other materials:

- Material of Choice for Trenchless Technology—used in directional boring, plowing, river crossings, pipe bursting and slippinling.
- Fewer fittings required due to pipe flexibility—allowable bending radius of 20 to 25 times O.D. of pipe.
- Longer lengths—40’ lengths mean fewer joints, faster installation and fewer problems.
- Lighter equipment can be used.
- Eliminates the need for thrust blocking—heat fused joints are fully restrained.
- Eliminates the need for UV storage protection—carbon black acts as a UV inhibitor.

Material Benefits

Bluestripe PE 3408 pressure rated material provides the superior characteristics required for your toughest applications. The material meets or exceeds AWWA C906 standards:

- Corrosion Resistance—No need to provide coatings, encasements, sacrificial or induced cathodic protection, or sacrificial wall thickness for corrosion concerns.
- Flexibility—Reduces the need for fittings, excellent in shifting soils and good performance in earthquake-prone areas.
- High Strain Allowance—Resists the effects of freezing and allows bending without the need for fittings.
- Excellent Impact Resistance, even at low temperatures.
- UV Protected, 2% carbon black acts as UV inhibitor—years of outdoor storage life.
- Lightweight.
- Permanent Identification—longitudinal blue stripes are co-extruded (not printed or painted) into the pipe’s outside surface. No matter how the pipe is turned, at least one stripe is always visible.

Bluestripe DR 11 AWWA C906 Pipe

<table>
<thead>
<tr>
<th>NOM. SIZE</th>
<th>O.D. (in.)</th>
<th>PSI</th>
<th>PRODUCT NUMBER</th>
</tr>
</thead>
<tbody>
<tr>
<td>4”</td>
<td>4.80</td>
<td>160</td>
<td>22086</td>
</tr>
<tr>
<td>6”</td>
<td>6.90</td>
<td>160</td>
<td>22122</td>
</tr>
<tr>
<td>8”</td>
<td>9.05</td>
<td>160</td>
<td>22163</td>
</tr>
<tr>
<td>10”</td>
<td>11.10</td>
<td>160</td>
<td>22178 1</td>
</tr>
<tr>
<td>12”</td>
<td>13.20</td>
<td>160</td>
<td>22215</td>
</tr>
<tr>
<td>16”</td>
<td>17.40</td>
<td>160</td>
<td>22336 1</td>
</tr>
<tr>
<td>18”</td>
<td>19.50</td>
<td>160</td>
<td>22342</td>
</tr>
<tr>
<td>20”</td>
<td>21.60</td>
<td>160</td>
<td>22346</td>
</tr>
<tr>
<td>24”</td>
<td>25.80</td>
<td>160</td>
<td>22369</td>
</tr>
</tbody>
</table>

NOTES:

- Bluestripe pipe is manufactured in 40’ lengths.
- Bluestripe DR11 is not stocked at all Team EJP locations.
- Refer to Section Q—Service Work for Polyethylene Fusion Services.
- DR 17 (100 psi) pipe is available. Please call for specific information.
Specification:

**SCOPE:**

This specification covers high density polyethylene (PE 3408) pressure pipe primarily intended for the transportation of potable water either buried or above grade.

**MATERIAL:**

- Materials used for the manufacturing of polyethylene pipe and fittings shall be PE 3408 High Density Polyethylene (HDPE) meeting the ASTM D3350 cell classification of 345434C.
- The material shall have a minimum Hydrostatic Design Basis (HDB) of 1600 psi at 73°F when tested in accordance with PPI TR-3 and shall be listed in the name of the pipe and fitting manufacturer in PPI TR-4.
- The material used in the production of potable water pipe shall be approved by the National Sanitation Foundation (NSF).
- The Manufacturer shall certify that the materials used to manufacture pipe and fittings meet the requirements of this specification.

**PIPE:**

- Polyethylene pipe shall be manufactured in accordance with AWWA C906 for sizes 4” through 54”.
- Permanent identification of piping service shall be provided by co-extruding longitudinal blue stripes into the pipe’s outside surface. The striping material shall be the same material as the pipe material except for color. Stripes printed or painted on the pipe outside surface shall not be acceptable.

**FITTINGS:**

- Polyethylene fittings shall be made from material meeting the same requirements as the pipe. Polyethylene fittings shall be molded or fabricated by the manufacturer of the pipe.
- Where applicable, fittings shall meet the requirements of AWWA C906.
- Molded fittings shall be manufactured in accordance with either ASTM D2683 (socket fused) or ASTM D3261 (butt fused) and shall be so marked.

**INSTALLATION AND TESTING**

- Joints between plain ends of polyethylene pipe shall be made by butt fusion when possible. The Pipe Manufacturer’s fusion procedures shall be followed at all times as well as the recommendations of the Fusion Machine Manufacturer. The wall thicknesses of the adjoining pipes shall have the same DR at the point of fusion.
- When saddle connections are fusion welded the Manufacturer’s recommended saddle fusion procedures shall be used.
- If mechanical fittings (which are designed for, or tested and found acceptable for use with polyethylene pipe) are utilized for transitions between pipe materials, repairs, joining pipe sections, saddle connections, or at other locations, the recommendation of the Mechanical Fitting Manufacturer must be followed. These procedures may differ from other pipe materials.
- Socket and Saddle fusions shall be tested by a bent strap test as described by the Pipe Manufacturer. The pipe Manufacturer shall provide visual guidelines for inspecting the butt, saddle, and socket fusion joints.
- Pressure testing shall be conducted in accordance with the Manufacturer’s recommended procedure. Pressure testing shall use water as the test media. Pneumatic (air) testing is prohibited.