

Pipe A-25

Polyethylene Pressure Pipe

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.

SHORT SPEC:

Polyethylene pipe shall be made from high density, extra high molecular weight compound equaling a PE 3408 designation and shall conform to ASTM-1248 and ASTM-3350; with a cell classification of 345434C.

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

NOTE:

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

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Fusion joining of HDPE pipe

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.

*EHMW = Extra high molecular weight.

Installation:

The HDPE 3408 piping system may be directly buried, sliplined 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)

- **YELLOW** - Gas, Oil, Steam, Petroleum or Gaseous Materials
- **ORANGE** - Communication, Alarm or Signal Lines, Cables or Conduit
- **BLUE** - Water, Irrigation and Slurry Lines
- **GREEN** - Sewers and Drain Lines
- **PURPLE** - Reclaim Water Lines

NOTES:

- All HDPE 3408 pipe is identified with applicable specification information and/or color-code stripe.
- Limited customized polyethylene pipe is available upon request.
- A full line of molded and custom fabricated HDPE fittings are available. This insures a complete HDPE 3408 system.
- Pipe is supplied in standard 40' laying lengths in sizes 2" thru 54". Also available in 50' lengths.
- Please call your local Team EJP sales office for assistance in selecting the piping system best suited to meet your needs.

†See pages A-28 for *Blue-Stripe AWWA C906 Pipe* with ductile iron pipe O.D.

Polyethylene MJ Adaptor



- For joining IPS or DI size polyethylene pipe to any ANSI/ AWWA C153 ductile iron compact fitting and valve.
- Molded from a NSF listed high density resin
- Fully complies with AWWA C901, 906
- Polyethylene MJ Adaptors require longer T-head bolts for ease of assembly.

PIPE SIZE	SDR	IPS SIZE	DI SIZE
		PRODUCT NUMBER	PRODUCT NUMBER
4"	11	22089	22089 1
6"	11	22129	22129 1
8"	11	22167 5	22167 6
10"	11	22184 5	22184 6
12"	11	22229	22229 1

NOTE: 3" and 14" thru 24" sizes are special order.

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PE 3408 Industrial Piping System Pipe Data and Pressure Ratings

PRESSURE RATING		255 PSI SDR 7.3		200 PSI SDR 9		160 PSI SDR 11		130 PSI SDR 13.5		100 PSI SDR 17		50 PSI SDR 32.5	
IPS PIPE SIZE	O.D. SIZE (IN.)	MIN. WALL (in) AVG. ID (in)	WEIGHT LB/FT	MIN. WALL (in) AVG. ID (in)	WEIGHT LB/FT	MIN. WALL (in) AVG. ID (in)	WEIGHT LB/FT	MIN. WALL (in) AVG. ID (in)	WEIGHT LB/FT	MIN. WALL (in) AVG. ID (in)	WEIGHT LB/FT	MIN. WALL (in) AVG. ID (in)	WEIGHT LB/FT
2"	2.375	.325 1.686	.91	.264 1.815	.76	.216 1.917	.64	—	—	—	—	—	—
3"	3.500	.479 2.485	1.98	.389 2.675	1.65	.318 2.826	1.39	.259 2.951	1.15	.206 3.063	.93	—	—
4"	4.500	.616 3.194	3.27	.500 3.440	2.74	.409 3.633	2.30	.333 3.794	1.90	.265 3.938	1.54	—	—
†5"	5.563	.762 3.948	5.00	.618 4.253	4.18	.506 4.490	3.50	.412 4.690	2.91	.327 4.870	2.35	—	—
6"	6.625	.908 4.700	7.09	.736 5.065	59.3	.602 5.349	4.97	.491 5.584	4.13	.390 5.798	3.34	.204 6.193	1.80
7"	7.125	—	—	—	—	—	—	—	—	.420 6.237	3.87	.220 6.661	2.09
8"	8.625	1.182 6.119	12.01	.958 6.594	10.05	.785 6.963	8.43	.639 7.270	7.00	.508 7.550	5.66	.265 8.063	3.05
10"	10.75	1.473 7.627	18.66	1.194 8.219	15.62	.978 8.679	13.10	.797 9.062	10.89	.633 9.410	8.80	.331 10.048	4.75
12"	12.75	1.747 9.046	26.25	1.417 9.746	21.97	1.160 10.293	18.43	.945 10.749	15.31	.750 11.160	12.36	.392 11.919	6.67
14"	14.00	1.918 9.046	31.64	1.556 10.701	26.49	1.273 11.301	22.20	1.037 11.802	18.44	.824 12.253	14.91	.431 13.086	8.05
16"	16.00	2.192 11.353	41.34	1.778 12.231	34.61	1.455 12.915	29.00	1.185 13.488	24.09	.941 14.005	19.46	.492 14.957	10.51
18"	18.00	2.466 12.772	52.31	2.000 13.760	43.79	1.636 14.532	36.69	1.333 15.174	30.48	1.059 15.755	24.65	.554 16.826	13.29
20"	20.00	2.740 14.191	64.57	2.222 15.289	54.05	1.818 16.146	45.30	1.481 16.860	37.64	1.176 17.507	30.42	.615 18.696	16.41
22"	22.00	—	—	2.444 16.819	65.41	2.000 17.760	54.82	1.630 18.544	45.56	1.294 19.257	36.81	.677 20.565	19.87
24"	24.00	—	—	2.667 18.346	77.85	2.182 19.374	65.24	1.778 20.231	54.22	1.412 21.007	43.82	.738 22.435	23.62
†26"	26.00	—	—	2.889 19.875	—	2.364 20.988	76.58	1.926 21.917	63.63	1.529 22.759	51.40	.800 24.304	27.74
†28"	28.00	—	—	—	—	2.545 22.605	88.79	2.074 23.603	73.76	1.647 25.508	59.62	.862 26.173	32.20
†30"	30.00	—	—	—	—	2.727 24.219	101.94	2.222 25.289	84.68	1.765 26.528	68.45	.923 28.043	36.92
†32"	32.00	—	—	—	—	2.909 25.833	115.99	2.370 26.976	96.35	1.882 28.010	77.86	.985 29.912	42.04
†34"	34.00	—	—	—	—	3.090 27.450	130.92	2.519 28.660	108.80	2.000 29.760	87.91	1.046 31.782	47.44
†36"	36.00	—	—	—	—	—	—	—	—	2.118 31.510	98.56	1.108 33.651	53.18

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.

†Subject to minimum order quantities and availability of tooling.

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Polyethylene Pressure Pipe Bluestripe AWWA C906 Pipe

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 sliplining.
- 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

NOM. SIZE	O.D. (in.)	PSI	PRODUCT NUMBER
4"	4.80	160	22086
6"	6.90	160	22122
8"	9.05	160	22163
10"	11.10	160	22178 1
12"	13.20	160	22215
16"	17.40	160	22336 1
18"	19.50	160	22342
20"	21.60	160	22346
24"	25.80	160	22369

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.

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Polyethylene Pressure Pipe Bluestripe AWWA C906 Pipe

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.