PWEagle

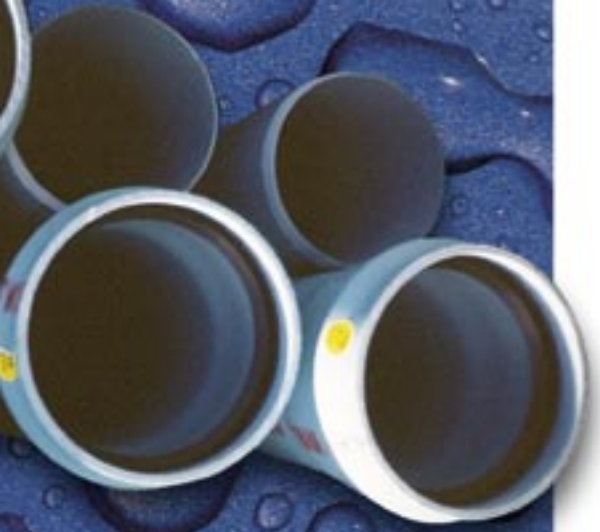
Ultra-Blue AWWA C909

CL150 & CL200 CIOD

Molecular oriented PVC pipe for high strength and superior performance

PWEagle

Waterworks Products



Ultra-Blue is a PVC pressure pipe which achieves its strength and ductility through molecular orientation. By expanding conventionally extruded PVC starting stock, Ultra-Blue's physical properties are enhanced. The resulting pipe has a greater hydrostatic design basis (HDB) when compared to conventionally extruded PVC pipe. With an HDB of 7,100 psi, Ultra-Blue has greater hoop strength resulting in a lighter weight, tougher pipe with an inside diameter that is larger than conventional PVC pipe of the same diameter and pressure rating.

Introduction

Ultra-Blue PVCO Pressure Pipe manufactured by PWEagle combines innovative engineering design with years of experience in PVC pipe manufacturing. The result is a higher performance, lighter weight, more cost-effective pressure pipe for potable water and force main systems.

PVCO stands for Molecular Oriented Poly Vinyl Chloride (PVC). The process of molecular orientation has long been used to strengthen many materials. Ultra-Blue is manufactured by a process that reorients the molecules of conventionally extruded PVC pipe. The starting stock pipe, approximately half the diameter and twice the wall thickness of the finished Ultra-Blue product, is placed inside a mold sized to the proper outside diameter of the finished product. The temperature of the starting stock is raised to the appropriate level for expansion and internal pressure is applied. This internal pressure causes the pipe to uniformly expand to the inside dimensions of the mold. The mold is designed so that during the expansion process, the bell and gasket groove are also formed.

During the expansion process, the molecular orientation is changed from the linear direction to the hoop and the physical properties of the finished pipe product are established. Improvements in design and physical properties include greater hoop strength, greater impact strength, enhanced cyclic fatigue resistance, lighter weight, larger inside diameter, and greater flow capacity.

Ultra-Blue meets all the requirements of AWWA C909 Class 150 and Class 200 psi having a 2.5 to 1 safety factor in long term hydrostatic strength and a 4 to 1 safety factor in quick burst. Manufactured with ductile iron pipe diameters, coventional ductile iron fittings can be used without the need for transition gaskets.

Features

Greater Hoop Strength

The unique material structure of Ultra-Blue gives it a burst strength greatly in excess of conventional PVC pressure pipe with the same wall thickness. Long term hydrostatic pressure tests show Ultra-Blue has a Hydrostatic Design Basis (HDB) of 7,100 psi. Conventional PVC pressure pipe has an HDB of 4,000 psi. With equivalent safety factors, the wall thickness of Ultra-Blue can be reduced to approximately half that of conventional PVC pipe and still maintain the same pressure rating.

Corrosion Free

Ultra-Blue, because it is non-metallic, will not corrode.

Lighter Weight

Ultra-Blue is lighter weight than ductile iron and conventional PVC pipe of the same Pressure Class. The table included in this publication compares the weight of Ultra-Blue, ductile iron and conventional PVC pipe. The difference results in easier handling and installation.

Greater Impact Strength

Impact tests per ASTM D2444 demonstrate Ultra-Blue's superior impact resistance when compared to conventional PVC pressure pipe. Ultra-Blue has an impact strength three to four times greater than conventional PVC pipe of the same class.

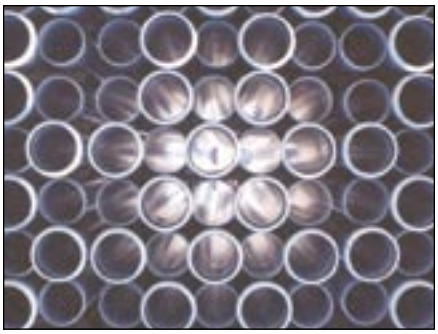
Performance

Enhanced Cyclic Fatigue Resistance

Abrupt pressure changes in a pipe line contribute to cyclic stresses and expansion and contraction of the pipe. Ultra-Blue's oriented configuration contributes to exceptional cyclic fatigue resistance, which is much greater than conventional PVC pipe. Ultra-Blue allows four times the number of cycles to failure, compared to conventional PVC pipe.

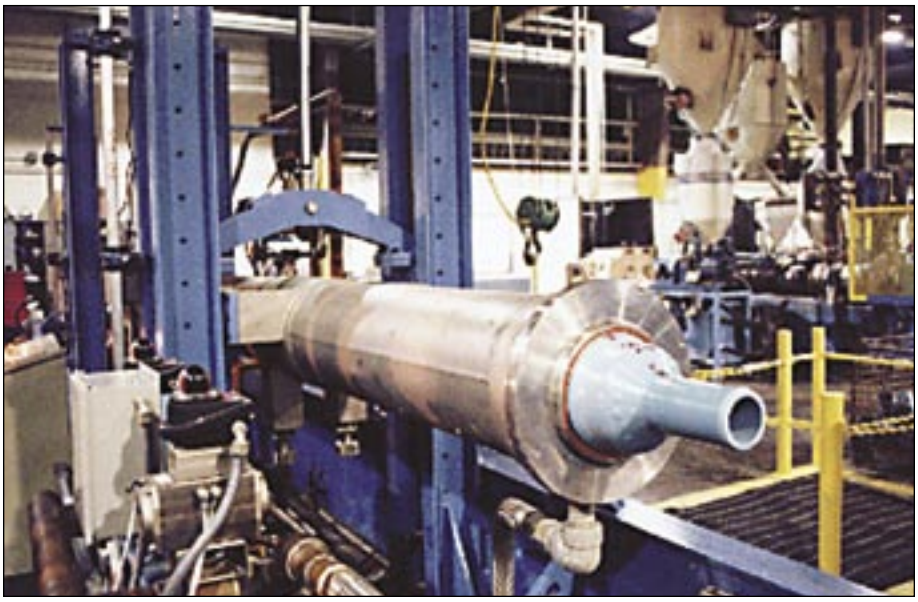
Larger Inside Diameter Equals Superior Flow Capacity

Compared to conventional C900 PVC, Ultra-Blue's high hoop strength results in thinner walls for the same pressure rating. Since the two products have the same CIOD's, thinner walls mean increased flow areas for Ultra-Blue. In fact, since both products have the same flow coefficient (C=150) and the same laying lengths (20 feet), Ultra-Blue will provide at least 12% greater flow capacity than C900 PVC pipe of the same pressure rating.



Ultra-Blue Benefits

- **Non-Corroding**
- **Ductile Iron Pipe O.D.s**
  No transition gaskets or special fittings required
- **Larger I.D. than Ductile Iron or Conventional PVC Pipe**
  Superior flow capacity and less head loss
- **Lighter Weight than Ductile Iron or Conventional PVC Pipe**
  43% lighter than C900 DR18 and DR14, safer and easier to handle, lower installed cost and more footage installed per day
- **Higher Impact Strength**
  Four times regular PVC and no linings to crack or flake off
- **Greater Cyclic Strength**
- **Higher Design Basis Compared to Conventional PVC Pipe**
  HDB of 7100 psi versus 4000 psi
- **Superior Notch Resistance**
  Resists splitting and crack propagation
  Pipe will not split from end to end
- **One of the Safest and Easiest Pressure Pipes to Tap**



Ultra-Blue has a greater hydrostatic design basis (HDB) when compared to conventionally extruded PVC pipe.

Weight Comparison

AWWA C909/CIOD - Class 150 psi			
Nominal Pipe Size (inches)	UB Approx Wt (lbs/ft)	DR18 Approx Wt (lbs/ft)	DI Approx Wt (lbs/ft)
6	2.80	5.12	16.75
8	4.82	8.89	22.25
10	7.70	13.47	28.50
12	10.45	19.00	36.50

AWWA C909/CIOD - Class 200 psi			
Nominal Pipe Size (inches)	UB Approx Wt (lbs/ft)	DR14 Approx Wt (lbs/ft)	DI Approx Wt (lbs/ft)
6	3.70	6.45	16.75
8	6.60	11.25	22.25
10	9.70	17.00	28.50
12	13.70	24.20	36.50

Dimensional Comparison

		Ultra-Blue AWWA C909/CIOD			AWWA C900/C905 - CIOD			Ductile Iron*		
Nominal Pipe Size (inches)	Pressure Class (psi)	Average OD (inches)	Min Wall Thickness (inches)	Approx ID (inches)	Average OD (inches)	Min Wall Thickness (inches)	Approx ID (inches)	Average OD (inches)	**Wall Thickness (inches)	***Net ID (inches)
6	150	6.90	0.209	6.45	6.90	0.383	6.02	6.90	0.25	6.025
8	150	9.05	0.274	8.47	9.05	0.503	7.91	9.05	0.25	8.175
10	150	11.10	0.336	10.38	11.10	0.617	9.72	11.10	0.26	10.205
12	150	13.20	0.400	12.35	13.20	0.733	11.56	13.20	0.28	12.265
6	200	6.90	0.271	6.32	6.90	0.493	5.80	6.90	0.25	6.025
8	200	9.05	0.355	8.29	9.05	0.646	7.63	9.05	0.25	8.175
10	200	11.10	0.435	10.17	11.10	0.793	9.37	11.10	0.26	10.205
12	200	13.20	0.518	12.09	13.20	0.943	11.14	13.20	0.28	12.265
16	100	17.40	0.370	16.61	17.40	0.696	15.92	17.40	0.34	16.61

* Based on PC 350 ductile iron pipe — if thickness classes are used, wall thicknesses increase and ID's decrease.
** Based on PC 350 ductile iron pipe — thickness includes design strength and tapping, and is subject to tolerances.
*** Includes cement mortar lining

Ultra-Blue Pipe Dimensions & Weights

Nominal Pipe Size (inches)	Pressure Class (psi)	Approx Bell OD (inches)	Average Pipe OD (inches)	Min Wall Thickness (t) (inches)	Approx ID (inches)	Stop Line Distance (v) (inches)	Approx Weight (lbs/ft)	Approx Weight (lbs/Jnt)
6	150	8.40	6.90	0.209	6.45	5¾	2.8	56
8	150	10.75	9.05	0.274	8.47	6½	4.8	96
10	150	13.23	11.10	0.336	10.38	7¼	7.7	154
12	150	15.48	13.20	0.400	12.35	7¾	10.5	210
6	200	8.53	6.90	0.271	6.32	5¾	3.7	75
8	200	10.92	9.05	0.355	8.29	6½	6.6	132
10	200	13.43	11.10	0.435	10.17	7¼	9.7	194
12	200	15.72	13.20	0.518	12.09	7¾	13.7	274
16	100	18.22	17.40	0.370	16.61	9½	13.4	268

* 16" Ultra-Blue™ is both PC100 and PR165.

Standards & Listings

Ultra-Blue (PVCO) pipe shall be manufactured in accordance with the following standards:

AWWA C909 - AWWA Standard for Molecular Oriented Poly(Vinyl Chloride) (PVCO) Pressure Pipe, 4"-12", for Water Distribution

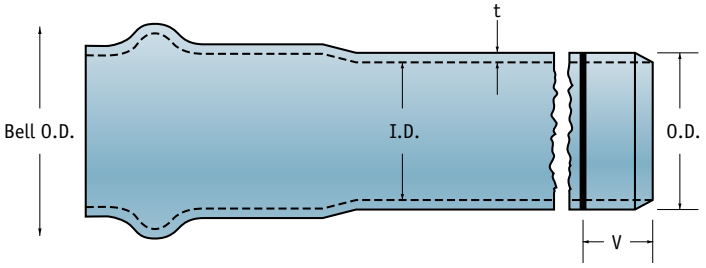
ASTM D1784 - Specification for Rigid Poly(Vinyl Chloride) (PVC) Compounds and Chlorinated Poly(Vinyl Chloride) (CPVC) Compounds.

ASTM D3139 - Specification for Joints for Plastic Pressure Pipes Using Flexible Elastomeric Seals

UNI-B-1 - Recommended Specification for Thermoplastic Pipe Joints - Pressure and Non-Pressure Applications

ANSI/NSF Standard No. 61 - Drinking Water System Components - Health Effects

UL Listed



Installation

The Sealing System

Ultra-Blue joints employ gasket systems that have excellent track records in the field. The joining systems are factory-made with rubber gaskets installed in the ring groove at the time of manufacture. The gaskets are designed to be retained in the ring groove during transportation and installation. When assembled following PW Eagle instructions, the secured Ultra-Blue gasket will not be displaced.

Backfilling and Testing

Backfilling should be done immediately after installing each length of pipe. Backfill that will lie adjacent to the pipe should contain no large rocks or hard clods. Tamp around and under the pipe to insure adequate soil support. Pipe may be tested at any time after installation. Prior to testing, make sure the line is properly thrust blocked and all air has been evacuated. Do not exceed the maximum water pressure rating of the pipe.

Fittings

Ultra-Blue has ductile iron (DI) outside diameters (O. D.), making standard PVC gasketed fittings compatible. **(Note: solvent weld PVC fittings cannot be used.)** Ductile iron or cast iron mechanical joint fittings and ductile iron push on type fittings can be installed directly onto Ultra-Blue, using the standard M.J. gasket made for cast iron or ductile iron pipe. When using M.J. fittings, 55 ft./lbs. of torque is recommended.

Joint Restraint Devices

Any joint restraint devices that are commonly used with standard PVC can be used with Ultra-Blue.

Joint Assembly

Ultra-Blue will arrive on the jobsite with the gasket installed, ready for assembly. Assemble as follows:

1. Inspect the bell and remove any foreign matter such as mud, sand or ice. Clean but do not remove gasket.
2. **Clean off the spigot end of the pipe and apply lubricant to the spigot end, covering the beveled nose and sealing surface all the way to the stop mark.**
3. Place the beveled end in the companion bell and provide straight alignment.
4. Push the pipe straight home with a bar and block until the stop mark on the spigot end is even with the end of the bell.
5. After assembly to the stop mark, the joint may be deflected axially up to two degrees.

Note:

1. Do not assemble the joint by swinging or stabbing.

2. Ultra-Blue cannot be solvent welded.

Tapping

Ultra-Blue is one of the easiest and safest pipes to tap. Ultra-Blue may be tapped with the same tapping saddles used on conventional C900 PVC pipe. The service clamps or saddles used should:

a) conform to the OD of the pipe.

b) provide full support around the circumference of the pipe.

c) provide a bearing area of sufficient width along the axis of the pipe.

Note:

Direct tapping is not allowed.

PWEagle combines three decades of success with tomorrow's technology

PWEagle manufactures PVC pipe for a variety of applications servicing the potable water, well casing, sewer, agriculture, turf, plumbing, communications and electrical market. PWEagle products are available from distributors throughout the United States and parts of Western Canada. Our facilities in Washington, Oregon, California, Utah, Nebraska, Texas, Missouri and West Virginia assure on-time delivery.

PW Eagle Facilities Are Located In:

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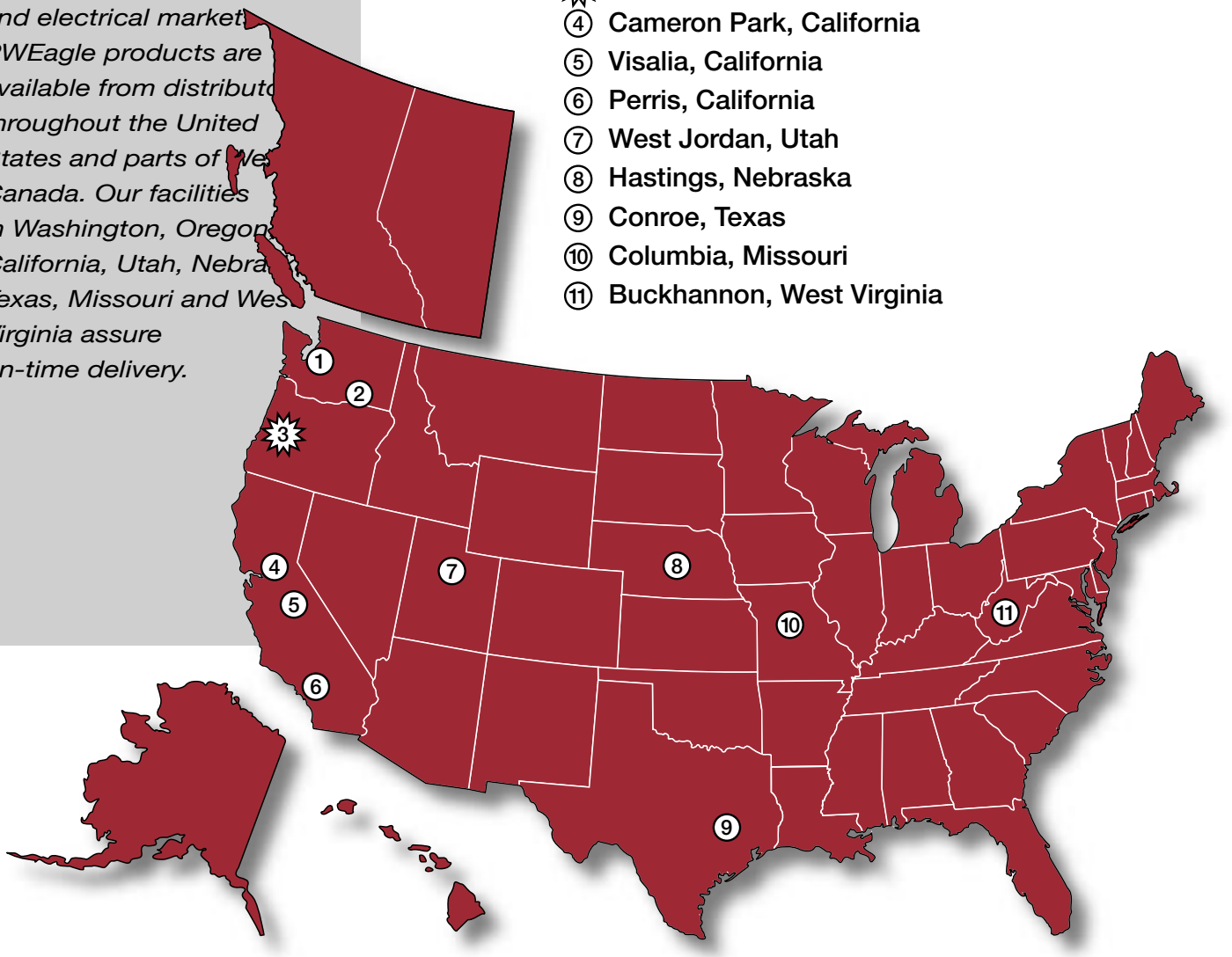

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