



Fusible PVC[®] Pipe Systems
Fusible C-900[®] • Fusible C-905[®] • FPVC[®]

www.undergroundolutions.com



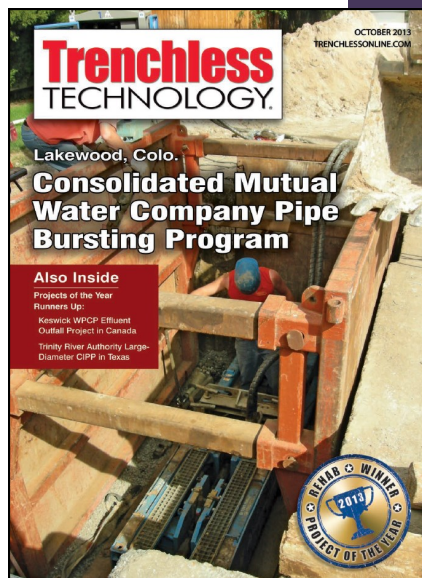


Features and Benefits:

- The only fusible polyvinyl chloride (PVC) pipe system
- Patented thermal butt fusion technology and PVC formulation
- Sizes ranging from 4" to 36"
- Monolithic, fully-restrained pipe system
- Bendable, gasket-free joints that do not leak
- Readily connects to standard waterworks fittings
- U.S. municipalities install more PVC pipe than any other pipe material
- 100 year design life (per PVC Pipe Association)
- Greater recommended safe pulling allowance than HDPE pipe of similar ID and pressure class
- Greater recommended safe pulling force than self-restrained, gasketed PVC pipe joints
- Lower installation costs due to lighter weight and smaller OD
- Excellent abrasion and scratch-resistance
- Superior resistance to hydrocarbon permeation compared to HDPE or gasketed pipe
- Superior resistance to oxidation from chlorine-based disinfectants versus HDPE pipe
- Joint OD consistent with OD of pipe barrel
- Enables downsizing of casings in jack-and-bore installations

Award Winning Projects:

- 2013 Trenchless Technology Rehab Project of The Year
- 2010 Trenchless Technology New Installation Project of The Year
- 2007 Trenchless Technology New Installation Project of the Year Honorable Mention



Installations:

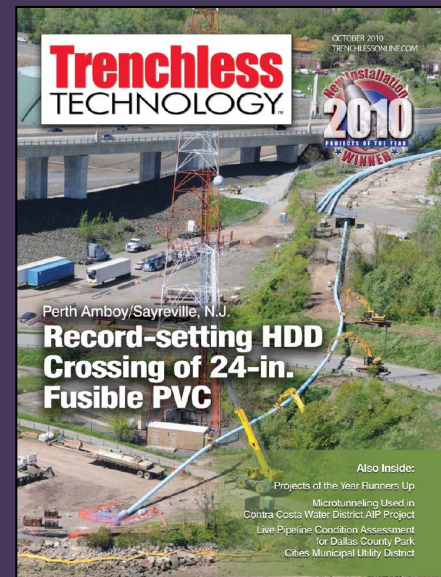
- Trenchless
 - Horizontal Directional Drilling (HDD)
 - Sliplining
 - Pipe Bursting
 - Jack-and-Bore Carrier Pipe
- Open-Cut

Applications:

- Water Mains (AWWA C900, C905, ASTM D2241)
- Gravity Sewer and Force Mains
- Water Reuse
- Irrigation and Raw Water
- Storm Drains
- Power Transmission Cable Conduit
- Communications, Low Voltage and Fiber Optic Conduit
- Casings
- Process Water

Experience:

- Over 7,000 Fusible PVC® Pipe Installations
- Over 8 million feet installed
- Installations in all 50 U.S. states, U.S. territories, Canada, Mexico and New Zealand
- Directional drill continuous pull-ins of greater than 6,000 feet
- Over 20 directional drill installations exceeding 3,000 feet
- Installed at over 30 military bases



C900

DIPS						
Size	OD	DR	Min. Wall (in)	Avg. ID (in)	Wt. (lb/ft)	Safe Pulling Force (lbs)
4"	4.80"	14	.34	4.07	3.1	13,400
		18	.27	4.23	2.5	10,600
6"	6.90"	14	.49	5.85	6.4	27,700
		18	.38	6.09	5.1	21,900
		25	.28	6.31	3.7	16,000
8"	9.05"	14	.65	7.68	11.0	47,700
		18	.50	7.98	8.7	37,800
		25	.36	8.28	6.4	27,600
10"	11.10"	14	.79	9.42	16.6	71,800
		18	.62	9.79	13.2	56,800
		25	.44	10.16	9.6	41,600
12"	13.20"	14	.94	11.20	23.5	101,600
		18	.73	11.65	18.6	80,300
		25	.53	12.08	13.6	58,800
14"	15.30"	14	1.09	12.98	31.6	136,500
		18	.85	13.50	25.0	108,000
		21	.73	13.75	21.6	93,400
		25	.61	14.00	18.3	79,000
16"	17.40"	14	1.24	14.76	41.5	176,200
		18	.97	15.35	32.4	139,700
		21	.83	15.64	28.0	120,800
		25	.70	15.92	23.7	102,200
18"	19.50"	18	1.08	17.20	40.6	175,400
		21	.93	17.53	35.1	151,700
		25	.78	17.85	29.8	128,400
		32.5	.61	18.17	24.5	105,100
20"	21.60"	18	1.20	19.06	49.8	215,300
		21	1.03	19.42	43.1	186,100
		25	.86	19.77	36.5	157,500
		32.5	.69	20.09	29.2	128,900
24"	25.80"	18	1.43	22.76	71.1	307,100
		21	1.23	23.19	61.5	265,600
		25	1.03	23.61	52.1	224,800
		32.5	.79	24.12	40.5	174,600
30"	32.00"	21	1.52	28.77	94.6	408,500
		25	1.28	29.29	80.1	345,800
		32.5	.99	29.91	62.3	268,700
		41	.78	30.35	50.1	214,200
36"	38.30"	21	1.82	34.43	135.5	585,100
		25	1.53	35.05	114.8	495,400
		32.5	1.18	35.80	89.2	384,600
		41	.93	36.32	71.9	306,900

C905

IPS						
Size	OD	SDR	Min. Wall (in)	Avg. ID (in)	Wt. (lb/ft)	Safe Pulling Force (lbs)
4"	4.50"	21	.21	4.05	1.9	8,000
		26	.17	4.14	1.5	6,400
6"	6.63"	17	.39	5.80	5.0	21,300
		21	.32	5.96	4.1	17,500
		26	.26	6.08	3.3	14,200
8"	8.63"	17	.51	7.55	8.4	36,200
		21	.41	7.76	6.9	29,600
		26	.33	7.92	5.6	24,000
10"	10.75"	17	.63	9.41	13.2	56,200
		21	.51	9.67	10.7	46,000
		26	.41	9.87	8.7	37,500
12"	12.75"	17	.75	11.16	18.6	79,100
		21	.61	11.47	15.0	64,700
		26	.49	11.71	12.3	52,800

Pipe sold in 40' and 45' lengths. Some sizes may require special order. Schedule, sewer and other pipe sizes are available upon request. Inquire for sizes.

Safe Pulling Force: Based on axial tensile stress of 7,000 psi per ASTM D1784 with a safety factor of 2.5.

Fusible C-900® and Fusible C-905® Product Lines Meet:

- AWWA C900/C905 requirements
- AWWA C605 – Underground Installation of PVC Pipe
- NSF 61, NSF 61-G
- ASTM cell class 12454 and HDB = 4,000 psi with a safety factor of 2.0, and resulting HDS = 2,000 psi

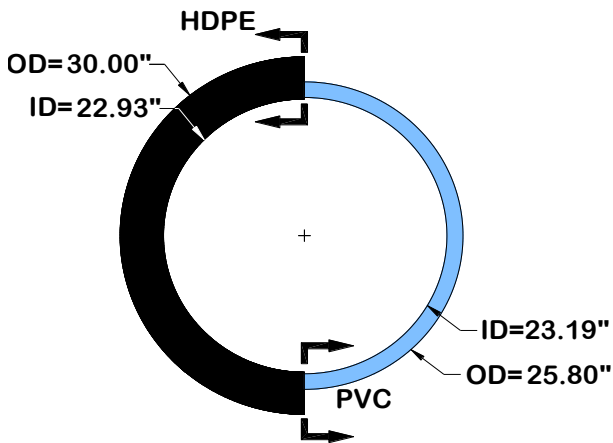
Fusible PVC® pipe is available in the following colors:

- Blue: Potable water
- Green: Force main and gravity sewer
- Purple: Water reuse
- Gray: Power cable and fiber optic conduit

Fusible PVC® pipe uses standard waterworks fittings.



PVC vs. HDPE Material Properties					
Property	Specification	PVC	PE 3408	PE 4710	Difference
Tensile Strength (psi)	ASTM D638	7,000	3,000	3,500	≥2x
Specific Gravity	ASTM D1505	1.40	0.94	0.95	
Hydrostatic Design Basis at 73°F (psi)	ASTM D2837	4,000	1,600		2.5x
Coefficient of Linear Expansion (in/in/°F)	ASTM D696	0.3x10 ⁻⁴ (0.36"/100'/10°F)	1.2x10 ⁻⁴ (1.44"/100'/10°F)		0.25x
Modulus of Elasticity (psi)	ASTM D638	400,000	110,000		3.6x
Water Disinfectant Induced Oxidation		High Resistance	Low Resistance		
Hydrocarbon Permeation		High Resistance	Low Resistance		



24" DR 21 Fusible C-905®
versus 30" DR 9 HDPE

	24" DR 21 PVC	30" DR 9 HDPE	PVC % Advantage
OD (in)	25.80	30.00	+16%
HDD Bore Vol. ¹ (cu ft/ft)	7.79	9.62	+23%
Min. Wall Thickness (in)	1.23	3.33	+171%
Avg. ID (in)	23.19	22.93	+1%
Pressure Rating ² (psi)	200	200	0%
Weight (lbs/ft)	61.5	121.6	+98%

1. OD+12"

2. Based on safety factor of 2.0

Dimension Ratio—Pressure Class Rating

PVC		HDPE 4710		HDPE 4710	
SF = 2.0		SF = 2.0		SF = 1.59	
DR	Pressure Rating (psi)	DR	Pressure Rating (psi)	DR	Pressure Rating (psi)
DR 14	305	DR 7.3	255	DR 7.3	317
DR 18	235	DR 9	200	DR 9	250
DR 21	200	DR 11	160	DR 11	200
DR 25	165	DR 13.5	128	DR 13.5	160
DR 32.5	125	DR 17	100	DR 17	125
DR 41	100	DR 21	80	DR 21	100

Supporting references at:

www.undergroundsolutions.com/references.php



Pressure Ratings

DIPS	
Dimension Ratio	Pressure (psi)
14	305
18	235
21	200
25	165
32.5	125
41	100

IPS	
Dimension Ratio	Pressure (psi)
17	250
21	200
26	160

Critical Buckling	
Dimension Ratio	Critical Buckling Pressure (psi)
14	426
17	228
18	190
21	117
25	68
26	60
32.5	30
41	15


Bend Radius

DIPS	
Size	Minimum Bend Radius
4"	100 ft.
6"	144 ft.
8"	189 ft.
10"	231 ft.
12"	275 ft.
14"	319 ft.
16"	363 ft.
18"	406 ft.
20"	450 ft.
24"	538 ft.
30"	667 ft.
36"	798 ft.

IPS / Schedule	
Size	Minimum Bend Radius
4"	94 ft.
6"	138 ft.
8"	180 ft.
10"	224 ft.
12"	266 ft.

Bend radius based on pipe OD with allowance for fittings, repairs, and maintenance along the entire length of the installation.

Patented Fusion Process

- Fusion is performed by UGSI technicians and/or licensed and trained contractors.
- Fusion times are comparable to other thermoplastic pipe materials.
- Testing performed in accordance with ASTM F1674 and D638 confirms that fused joints are fully restrained with axial tensile strength comparable to the nominal strength of the pipe barrel.


The Most Tested PVC Pipe in the Industry

Test Categories	Vendor Qualification	Required Vendor Testing	UGSI Lot Acceptance Testing	Fusion Joint QC Data Collection & Retention
AWWA C900 / C905	•	•	•	
ASTM D2241 / D1785 / 3034 / F679	•	•	•	
Extrusion Quality	•	•	•	
Mechanical Properties	•	•	•	
Process Control Points				•
Trained and Licensed Operators				•



San Antonio, TX



Apra Harbor, Guam



San Francisco, CA



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St. Petersburg, FL



Oakmont, PA



Williston, ND



Kansas City, MO



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Underground Solutions, Inc. (UGSI) provides infrastructure technologies for water and wastewater applications. UGSI's Fusible PVC® products, including Fusible C-900®, Fusible C-905® and FPVC®, contain a patented PVC formulation that, when combined with UGSI's patented fusion process, results in a monolithic, fully-restrained, gasket-free, leak-free piping system. UGSI's Duraliner™ is a patented, close-fit pipeline renewal system creating a stand-alone structural liner.

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