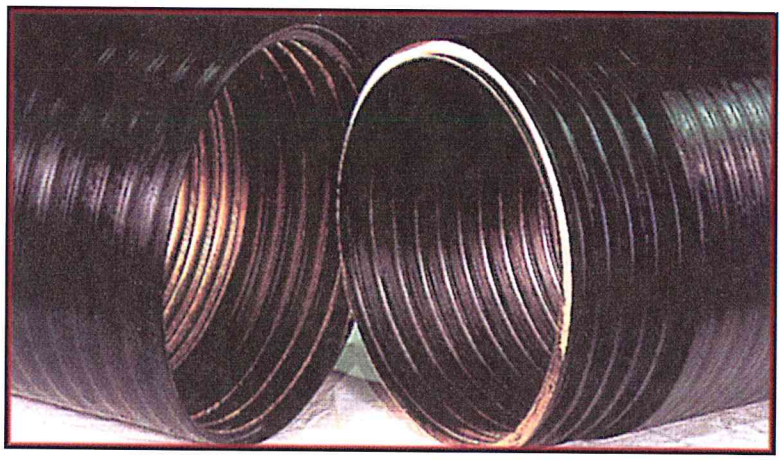
Poly Profiles Technology, Inc.

The Polyethylene Pipe Advantage



"Culvert Renew"® "Sewer Renew"® "Thread-Loc"® Joint

We're Not Just Another Pipe Company

What is Culvert Renew®?

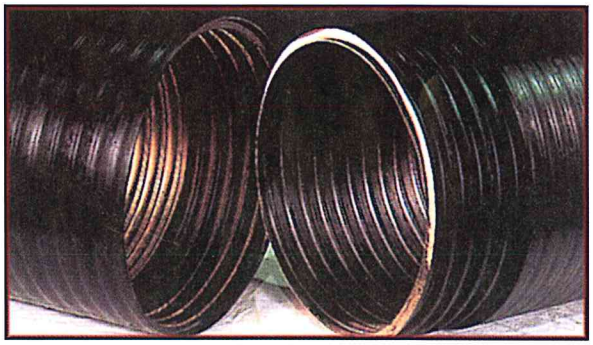
"Culvert Renew"® is a profile wall pipe manufactured from PE3408 premium grade, high density, extra high molecular weight, polyethylene resin. It is homogeneous and resistant to environment stress crack. "Culvert Renew"® is ID sized, manufactured in our plant in Steelville, MO and is suitable, but not limited to the following applications:

* CULVERT AND SANITARY SEWERS
* INSERTION RENEWAL OF CULVERT
* INSERTION RENEWAL OF STORM SEWERS
* STORM DRAINS
* MANHOLES AND CATCH BASINS
* LANDFILL INSPECTION RISERS
* OUTFALL PIPELINE
* DEWATERING PIPE
* IRRIGATION PIPE

The profile design of "Culvert Renew"® increases pipe stiffness, resistance to deflection and buckling. Pipe Stiffness is very high when compared to solid wall polyethylene pipe or other profile wall products.

Pipe Stiffness of Solid Wall F-714 Pipe per ASTM D2412

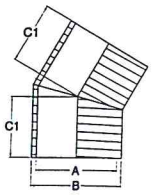
SDR	PS
41	6.6
32.5	13.6
26	27.2
21	53.1
For E =	95000

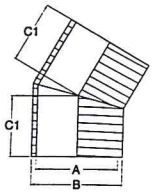


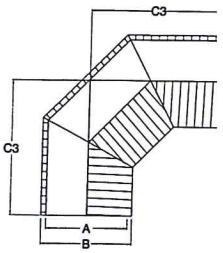
Our "screw together" coupling system is called "Thread-Loc"®. When two pipes are threaded together, they form a soil tight connection. This lightweight, strong, easy to install system makes an ideal, cost-effective choice for the insertion renewal of culvert and sewers and for direct burial applications.

Elbows

A Pipe ID (Inches)	B Pipe OD (Inches)	C1 1-30 (Inches)	C2 31-60 deg.. (Inches)	C3 61-90 deg.. (Inches)
15	16.9	9.3	11.9	34.0
18	20.2	11.7	14.8	40.8
21	23.7	12.2	15.8	42.6
24	27.1	17.6	21.8	44.3
27	30.4	18.1	22.8	45.9
30	33.8	20.5	25.8	47.6
36	40.7	21.4	31.0	53.3
40	45.2	24.1	31.0	53.3
42	47.5	24.4	31.7	54.5
48	53.8	27.2	35.5	61.0







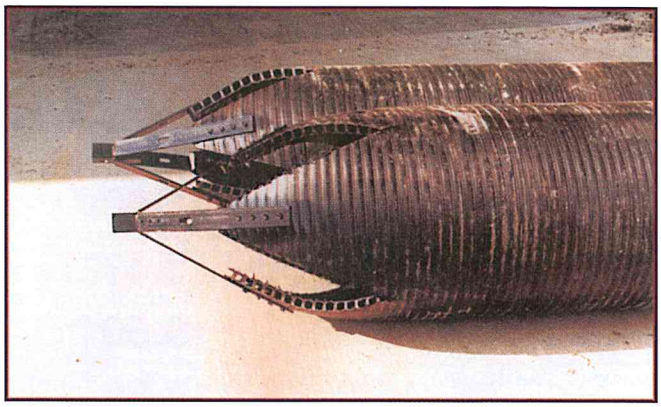
* Custom fittings are also available

Culvert Renew® Standard Dimensions

Nom Size	ID (IN)	OD (IN)	Allowable Crush Load (LBS/FT^2)	Pipe Stiffness (ps)	Max Axial Force (LBS)	RSC (LBS/FT)
STANDARD PROFILE						
10”	10.00	11.20	4580	46.8	3700	85
12”	12.00	13.47	4360	46.9	5100	101
13.5”	13.50	15.50	4290	48.1	6400	165
15”	15.00	16.85	4220	46.5	7700	126
18”	18.00	20.24	4200	47.1	11000	157
21”	21.00	23.65	3920	46.7	14000	179
24”	24.00	27.06	3930	47.1	18500	209
27”	27.00	30.43	3920	47.3	23300	234
30”	30.00	33.82	3830	46.9	28100	257
36”	36.00	40.65	3840	48.3	40800	319
LOW PROFILE						
12”L	12.00	13.20	3910	27.4	4400	55
15”L	15.00	16.47	3570	24.9	6300	70
18”L	18.00	19.85	3600	27.9	9200	97
21”L	21.00	23.24	3650	30.9	12800	124
24”L	24.00	26.65	3470	32.2	16000	149
27”L	27.00	30.06	3540	34.4	20700	182
30”L	30.00	33.43	3560	35.5	25800	207
36”L	36.00	39.82	3250	28.2	33400	194
40”L	40.00	44.65	3500	36.3	45000	277
42”L	42.00	46.65	3300	31.6	47200	252
48”L	48.00	53.80	3300	28.4	53000	189

Culvert Renew® Advantages

Strong and Tough
Lightweight
Corrosion and Chemical Resistant
Weather Resistant
High Flow Properties
Easy to Join
Cost Effective
Easy Insertion with Pulling Attachment



*Corrugated Metal Culvert Flow Capacity When Lined with "Culvert Renew"®

Original Corrugated Metal Pipe ID	"Culvert Renew®" Pipe ID	Percentage of Original CMP Flow
12"	10	164
15"	12	147
18"	13.5	124
18"	15	164
21"	18	177
24"	18	124
27"	21	136
30"	24	147
33"	27	156
36"	30	164
42"	30	109
48"	36	124
54"	42	136
60"	48	147
66"	48	114
72"	54	124
78"	60	132
84"	60	109
96"	72	124
120"	84	103

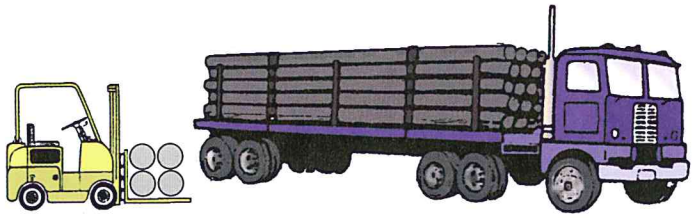
*PE Liner ID Required for Various Flows % vs Concrete Sewers/Culvert

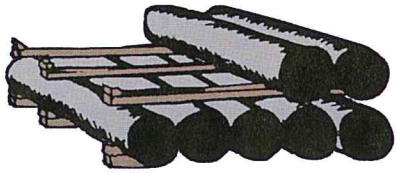
Existing Sewer Inside Diameter ID	Liner ID Required 100% Flow	Liner ID Required 95% Flow	Liner ID Required 90% Flow
12"	9.96	9.74	9.48
15"	12.45	12.15	11.85
16"	13.28	12.96	12.64
18"	14.94	14.58	14.22
21"	17.43	17.01	16.59
24"	19.92	19.44	18.96
27"	22.41	21.87	21.33
30"	24.90	24.30	23.70
36"	29.88	29.16	28.44
42"	34.86	34.02	33.18
48"	39.84	38.88	38.10
54"	44.82	43.74	42.86
60"	49.54	48.60	47.62

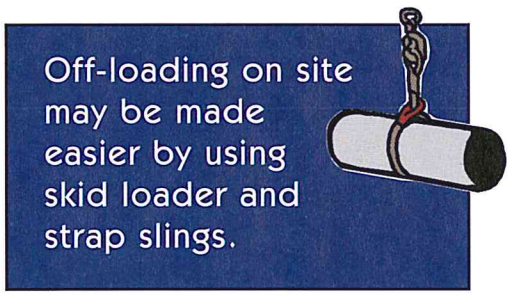
*Based on the following mannings "n" values. CMP Pipe .024 *Concrete Pipe .015 "CulvertRenew"® .009

Shipping, Handling and Stocking

Pipes should be lifted with a forklift or skid loader with a strap sling while loading and off loading. Chains should not be used. When off-loading, pipe can not be dropped, pushed, or bounced from the truck to the ground. Do not try to off load by hand. In severe weather, move pipe carefully because pipe may become slippery and hard to handle. Do not overload the truck and put plenty of straps on tightly.







At the time of delivery all pipe should be inspected and any material defects should be reported immediately. Pipes stacked on the ground should be supported and stacked only 4 to 5 units high depending on sizes not to exceed 9′ with proper scotching to stop from rolling on the bottom and causing an avalanche.

Short Form Engineering Specification

CULVERT RENEW® - SEWER RENEW® - Large Diameter Closed Profile, Culvert/Sewer Pipe

I. THE PRODUCT: The pipe is a helical-spiral manufactured with a smooth internal and external surface, inside diameter sized, hollow-wall closed profile, HDPE pipe. Standard profile pipe shall exhibit a pipe stiffness of 46 psi when tested in accordance with ASTM D-2412, and in accordance with municipal and highway specifications including AASHTO design specification, section 18, paragraphs 18, 4.0, 18, 4.1, etc. Low profile pipe stiffness shall be in a manner to develop the tensile strength of the pipe; and to manage thermally induced seasonal contraction. It is capable of being pushed (or jacked) into the host pipeline, and being pulled into the host pipeline without joint separation. The connection is the Thread-Loc® connection which threads the helical spiral together forming an integral joint. The OD and ID joint surfaces are substantially flush with the pipe OD and ID.

II. THE MATERIAL: The material from which the pipe is extruded is high density polyethylene "pipe grade" material listed by the Plastic Pipe Institute (PPI) as a PE 3408 resin; and exhibiting the physical properties described within the polyethylene material standard, ASTM D-3350, with a cell classification 345464C follows:

PROPERTY	SPECIFICATION	UNITS	NOMINAL VALUES
Material Designation	PPI/ASTM	-	PE3408
Material Classification	ASTM D-1248	-	III C 5 P34
Cell Classification	ASTM D-3350-98A	-	345464C
Density - Pipe	ASTM D-1505	gm/cm3	0.955
Flexural Modulus	ASTM D-790	psi	140,000
Tensile Strength-Pipe	ASTM D-638	psi	3400
ESCR (Condition C)	ASTM D-1693	F20 Hrs	>5000
HDB @ 73.4F	ASTM D-2837	psi	1600
UV Stabilizer	ASTM D-1603	% Carbon Black	2 Minimum
Brittleness Temperature	ASTM D-746	F	-150

The Manufacturer shall provide certification that the pipe was manufactured from one specific resin in compliance with these specifications upon request.

III. DIMENSIONS: Pipe sizes, inside diameters, and typical dimensions shall conform with those listed. The outside and inside diameter shall be hydraulically "smooth" and of a constant pipe dimension along the pipe length.

Standard Profile

NOMINAL ID (IN.)	NOMINAL OD (IN.)	NOMINAL ID (IN.)	NOMINAL OD (IN.)
10.00	11.20	21.00	23.65
12.00	13.47	24.00	27.06
13.50	15.50	27.00	30.43
15.00	16.85	30.00	33.82
18.00	20.24	36.00	40.65

Low Profile

NOMINAL ID (IN.)	NOMINAL OD (IN.)	NOMINAL ID (IN.)	NOMINAL OD (IN.)
12.00	13.20	27.00	30.06
15.00	16.47	30.00	33.43
18.00	19.85	36.00	39.82
21.00	23.24	40.00	44.65
24.00	26.65	42.00	47.20
		48.00	53.80

IV MARKING: Each pipe segment shall be identified with the product name, pipe stiffness designation, and manufacturing data.

V. INSTALLATION: For slip lining or insertion renewal, the pipe shall be installed in compliance with the manufacturer's guideline. Completion of the joint shall be effected by use of a strap wrench device with a suitable (4 foot minimum) bar or level to tighten the pipe. The pipe shall be kept level with support slings, rollers or other devices as approved by the owner or engineer. Chemical grouting or mastic sealing of the joint shall be done to manufacturer's recommendations.

Direct burial, bedding, backfill, and general installation requirements should comply with the specifications and guidelines of ASTM D-2321

Poly Profiles Technology, Inc.

The Polyethylene Pipe Advantage

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