

SCOPE:

This is an outline of procedures for the installation of Prinsco corrugated HDPE pipe for Storm Sewer and Culvert applications in accordance with ASTM and AASHTO specifications.

PRINCIPAL INSTALLATION REFERENCES:

ASTM D 2321: *Standard Practice for Underground Installation of Flexible Thermoplastic Sewer Pipe*

AASHTO SECTION 30, DIVISION II: *Standard Specifications for Highway Bridges*

CPPA TECHNICAL BOOKLET: *Recommended Installation Practices For Corrugated Polyethylene Pipe and Fittings*

CAN/CSA B182.11: *Recommended Practice for the Installation of Thermoplastic Drain, Storm and Sewer*

GENERAL:

Corrugated HDPE pipe, as with all buried pipe, functions as a buried structure where the performance of the structure is dependent on the quality of installation. This installation related information serves as a general guide for many common field conditions and stormwater management applications. Some projects, however, may have specific conditions or performance criteria beyond the scope of this installation guideline and shall be addressed by the design Engineer.

TRENCH INSTALLATION:

For maximum performance, the width of the trench should be restricted to what is essential to safely position and compact the backfill material on both sides of the pipe. The trench width should be no wider than what is represented in Table 2, except as necessary to construct the trench or install the pipe. AASHTO Section 30 recommends a minimum trench width of 1.5 times the pipe O.D. plus 12". ASTM D2321 recommends the greater of either the pipe O.D. plus 16" or 1.25 times the pipe O.D. plus 12".

BACKFILL MATERIALS:

Installed pipe performance is dependent upon the envelope material's installed density and its resistance to migration or disintegration under service conditions. Table 3 provides a listing and classification of common backfill materials along with detailed descriptions of each material. Table 4 provides guidance for the proper use and placement of acceptable backfill materials within each specific zone of the pipe-soil envelope. The information provided in tables 3 and 4 are based on ASTM D2321 and the backfill materials listed are typically used for all pipe materials (i.e. reinforced concrete pipe, corrugated metal pipe, etc.) operating under similar performance criteria.

Each type of backfill has associated advantages and disadvantages related to cost, permeability, strength, and ease of use these traits along with the project specific criteria should be used for the selection of an appropriate backfill material.

INSTALLATION AND JOINT CONNECTIONS:

GOLDFLO and ECOFLO Dual-Wall Pipe is available with standard or gasketed fittings. Pipe lengths may need to be altered in the field to comply with site requirements. GOLDFLO can be easily cut to length with a hand saw, reciprocating saw, or an equivalent tool. Always make the cut in the valley of the corrugation.

Bends of 22-1/2°, 45° and 90° are made using standard or gasketed Prinsco elbows. Prinsco recommends that all curvatures be limited to the joint for GOLDFLO and ECOFLO pipe (dual wall pipe), however GOLDLINE pipe may be installed in a curved trench with a bend radius not to exceed 3 times the diameter. For example, this would result to a bend radius of 30" for 10" GOLDLINE pipe.

BEDDING: Appropriate bedding is required to provide uniform support for the pipe and to sustain grade. Bedding material shall meet the allowable materials listed in Table 3 and as defined and described in Table 3. Avoid blocking to bring the pipe to grade and do not allow rocks over 1 1/2 inches to come into contact with pipe surfaces. A shovel or rake should be used to level the surface. The bedding shall be compacted in accordance with the

HAUNCHING: Adequate haunch support is critical to the installed performance of buried pipe. The haunch area encompasses the bedding zone up to the spring line of the pipe. If compaction is necessary, avoid disturbing the. Always work enough material under the haunch to provide adequate compaction.

BACKFILLING:

Backfill shall be placed in accordance with Table 4. During backfill placement, care should be taken to prevent rocks larger than 1 1/2-inch from entering the backfill material immediately around the the pipe. It is critical to properly compact the material in the haunching zone out to the undisturbed trench walls and to compact to the required density. Special care should be taken to reroute heavy construction traffic to ensure the pipe is protected from temporary overloading and damage. If heavy construction traffic cannot be rerouted, and the pipe is buried rather shallow, additional compacted soil should be mounded over the pipe to create at least three feet (1m) of cover over the pipe crown. This mound can then be graded at the end of construction when heavy traffic is no longer present.

TABLE 2: ENVELOPE & TRENCH DIMENSIONS

Pipe Size	Pipe OD (Nominal)	B Bed Depth Class I Material	C Min. Cover	H Min. Trench Depth (OD+B+C)	E Envelope Width	W Min. Trench Width (OD+2E)	F Initial Backfill	G Initial Backfill Over Pipe
3"	3.6	4 - 6	12	16 - 20	2-3	8	7	6
4"	4.6	4 - 6	12	17 - 21	8	21	8	6
6"	6.8	4 - 6	12	19 - 23	8	23	10	6
8"	9.5	4 - 6	12	22 - 26	8	25	11	6
10"	11.6	4 - 6	12	24 - 28	8	28	12	6
12"	14.2	4 - 6	12	26 - 30	8	30	13	6
15"	17.7	4 - 6	12	30 - 34	8	34	15	6
18"	22.0	4 - 6	12	34 - 38	9	40	17	6
24"	29.5	4 - 6	12	42 - 46	10	50	21	6
30"	35.4	4 - 6	12	51 - 53	12	59	24	6
36"	41.0	4 - 6	12	57 - 59	12	65	27	6
42"	48.1	4 - 6	12	64 - 66	18	84	30	6
48"	54.4	4 - 6	18	76 - 78	18	90	33	6
60"	66.5	4 - 6	18	85 - 91	18	102	39	6

INSTALLATION NOTE: Trenching machines and drainage plows allow for a slightly different form of installation practices and permissible backfill types, contractors should follow ASTM F 449 specifications.

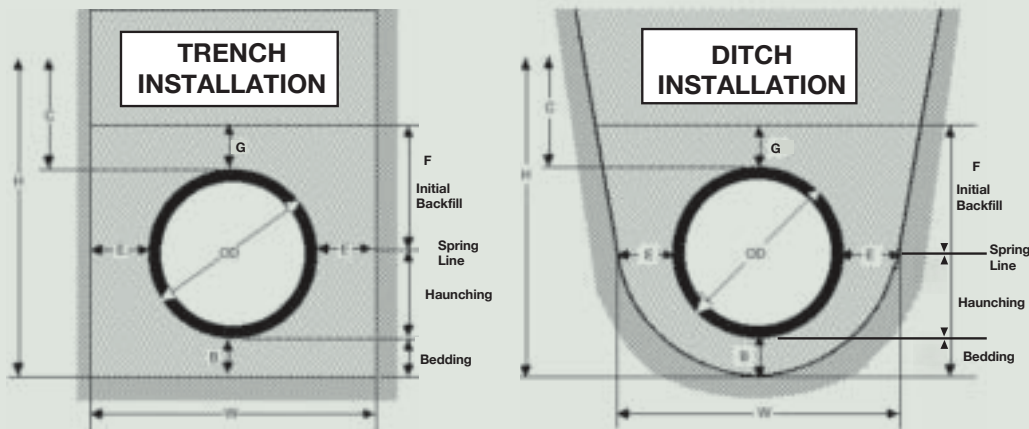


TABLE 3. PIPE EMBEDMENT MATERIAL

ASTM D2321		ASTM D2487		Percentage Passing Sieve Sizes			Atterberg Limits		
Class	Type	Notation	Description	AASHTO M43 Notation	1 1/2 in.	No. 4	No. 200	LL	PI
					(40 mm)	(4.75 mm)	(0.075 mm)		
IA	Manufactured Aggregates: clean open-graded	N/A	Angular crushed stone or rock, crushed gravel, broken coral, crushed slag, cinders or shells; large voids with little or no fines	5	100%	≤10%	<5%	Non Plastic	
II	Coarse-Grained Soils, clean	GW	Well-graded gravel, gravel/sand mixtures; little or no fines	57	100%	<50% of "Coarse Fraction"	<5%	Non Plastic	
		GP	Poorly-graded gravels, gravel/sand mixtures; little or no fines	6		>50% of "Coarse Fraction"			
		SW	Well-graded sands, gravelly sands; little or no fines	67					
		SP	Poorly-graded sands, gravelly sands; little or no fines						
	Coarse-Grained Soils, borderline clean/ fines	e.g. GW - GC, SP-SM	Sands and gravels which are borderline between clean and with fines			Varies	5% to 12%	Non Plastic	
III	Coarse-grained soils with fines	GM	Silty gravels, gravel/sand/silt mixtures	Gravel and sand with <10% fines	100%	<50% of "Coarse Fraction"	12% to 50%	<4 or <"A" Line	
		GC	Clayey gravels, gravel/sand/clay mixtures			>50% of "Coarse Fraction"		<7 or <"A" Line	
		SM	Silty sands, sand/silt mixtures					>4 or <"A" Line	
		SC	Clayey sands, sand/clay mixtures					>7 or <"A" Line	
IVA*	Fine-Grained Soils (inorganic)	ML	Inorganic silts and very fine sands, rock flour, silty or clayey fine sands, silts with slight plasticity		100%	100%	>50%	<50	
		CL	Inorganic clays of low to medium plasticity; gravelly, sandy, or silty clays; lean clays					>"A" Line	
IVB*	Fine-Grained Soils (inorganic)	MH	Inorganic silts, micaceous or diatomaceous fine sandy or silty soils, elastic silts		100%	100%	>50%	>50	
		CH	Inorganic clays of high plasticity, fat clays					>"A" Line	

* Class IVA and IVB materials are not recommended for use as pipe embedment materials.

TABLE 4. BACKFILL PLACEMENT AND COMPACTION

	Class IA	Class IB	Class II	Class III	Class IV
General Recommendations and Restrictions	Suitable for use as a drainage blanket and underdrain in rock cuts where adjacent material is suitably graded. Should not be used where conditions may cause migration of fines from adjacent soil and loss of pipe support.	Process materials as required to obtain gradation which will minimize migration of adjacent materials. Suitable for use as drainage blanket and underdrain.	Where hydraulic gradient exists check gradation to minimize migration. "Clean" groups suitable for use as drainage blanket and underdrain.	Should not be used where water conditions in trench may cause instability.	Not Recommended
Foundation	Suitable as foundation and for replacing over-excavated and unstable trench bottom as cautioned above. Install and compact in 6-in. maximum layers.	Suitable as foundation and for replacing over-excavated and unstable trench bottom. Install and compact in 6-in. maximum layers.	Suitable as a foundation and for replacing over-excavated and unstable trench bottom as restricted above. Install and compact in 6-in. maximum layers.	Suitable as foundation and for replacing over-excavated trench bottom as restricted above. Should not be used in thicknesses greater than 12 in. total. Install and compact in 6-in. maximum layers.	Not Recommended
Bedding	Install in 6-in. maximum layers. Level final grade by hand. Minimum depth 4 in. (6 in. in rock cuts).	Install and compact in 6-in. maximum layers. Level final grade by hand. Minimum depth 4 in. (6 in. in rock cuts).	Install and compact in 6-in. maximum layers. Level final grade by hand. Minimum depth 4 in. (6 in. in rock cuts).	Suitable only in dry trench conditions. Install and compact in 6-in. maximum layers. Level final grade by hand. Minimum depth 4 in. (6 in. in rock cuts).	Not Recommended
Haunching	Install in 6-in. maximum layers. Work in around pipe by hand to provide uniform support.	Install and compact in 6-in. maximum layers. Work in around pipe by hand to provide uniform support.	Install and compact in 6-in. maximum layers. Work in around pipe by hand to provide uniform support.	Install and compact in 6-in. maximum layers. Work in around pipe by hand to provide uniform support.	Not Recommended
Initial Backfill	Install to a minimum of 6 in. above pipe crown.	Install and compact to a minimum of 6 in. above pipe crown.	Install and compact to a minimum of 6 in. above pipe crown.	Install and compact to a minimum of 6 in. above pipe crown.	Not Recommended
Embedment Compaction	Place and work by hand to insure all excavated voids and haunch areas are filled. For high densities use vibratory compactors.	Minimum density 85 % Standard Proctor. Use hand tampers or vibratory compactors.	Minimum density 85 % Standard Proctor. Use hand tampers or vibratory compactors.	Minimum density 90 % Standard Proctor. Use hand tampers or vibratory compactors. Maintain moisture content near optimum to minimize compaction effort.	Not Recommended
Final Backfill	Compact as required by the Engineer.	Compact as required by the Engineer.	Compact as required by the Engineer.	Compact as required by the Engineer.	Not Recommended

BELL AND SPIGOT INSTALLATION

Remove the protective wrap from the gasket on the spigot end of the pipe. It is imperative that both the bell and the spigot ends of the pipe connection are clean and free of any dirt or foreign material.

The gasket and bell must be thoroughly lubricated with pipe lubricant available from Prinsco. Generously apply pipe lube to the gasket area of the spigot end of the connection as well as the inside surface of the bell.

Spigots must always be pushed into bells! While smaller diameter pipe may be assembled by hand, most large diameter applications will require mechanical means to make the connection. When mechanical means are applied, a push block or scrap stub of pipe shall be used to apply the force to ensure the installed pipe is not damaged. During joint insertion, attention should be placed on the depth of the bell to ensure the spigot is properly homed without applying excessive force and without excessive internal joint gap.

If problems are encountered with gasket seating, it is usually due to lack of adequate gasket and coupler lubrication or improper insertion technique. The gasket may pull out of position if the assembly is not properly lubricated, resulting in compromised joint performance.

GASKET AND SNAP COUPLER INSTALLATION

Prinsco Snap Couplers and Gaskets are designed to be used exclusively with Prinsco GOLDFLO/ECOFLO WT and Goldline Pipe. The couplers may be used with or without the gaskets. When using the gasketed application, two gaskets are required: one for each end of the pipe inserted into the coupler.

Gaskets must be lubricated with biodegradable, nonpetroleum-based pipe joint lubricant before installation on the pipe. It is important to make sure that both the gasket and coupler are completely lubricated. The gaskets are placed so that they stand in the valley between the first and second pipe rib from the end to be coupled.

Snap couplers may be shipped separated from the pipe and should be fitted to one pipe end before it is installed in the trench. Extra care must be taken to keep the gasket and coupler clean and free from dirt in order to assure a good seal. The corrugations will drag trench material into the coupler bell unless care is taken. It is recommended that a clean plastic or plywood sheet be placed under the joint while assembling the coupling. The couplers are designed so that four pipe corrugation ribs enter the coupler when the coupler and pipe are fully engaged. Care must be taken to fully engage both pipe ends into the coupler.

If problems are encountered with gasket seating, it is usually due to lack of adequate gasket and coupler lubrication. The gasket may pull out of position if the assembly is not properly lubricated.

PIPE LUBE

Aerosol pipe joint lubricant effectively lubricates pipe and pipe gaskets for safe and efficient assembly of Prinsco's GOLDFLO_WT/ECOFLO integral bell coupling system. The unique aerosol valve allows the lubricant to be neatly applied to the gasket and the corresponding bell.

- Foam Lubricant
- Effect on gaskets:
 - < 1.0% Weight Gain
 - < 1 Durometer Hardness Loss
- Meets NSF Standard #61
- Biodegradable
- Stable from 0° to 110° F
- Nontoxic

Do not spray near sparks, heat or open flame. Do not smoke while using.