Kanaflex®

Kanapipe™ Installation Guide

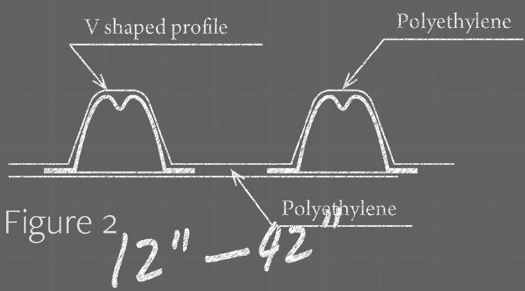


Figure 2

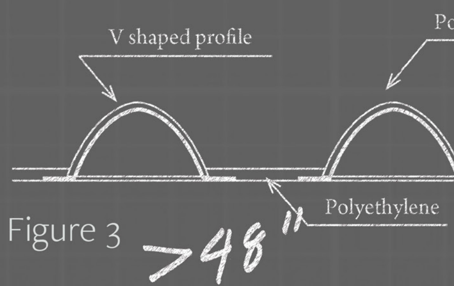


Figure 3

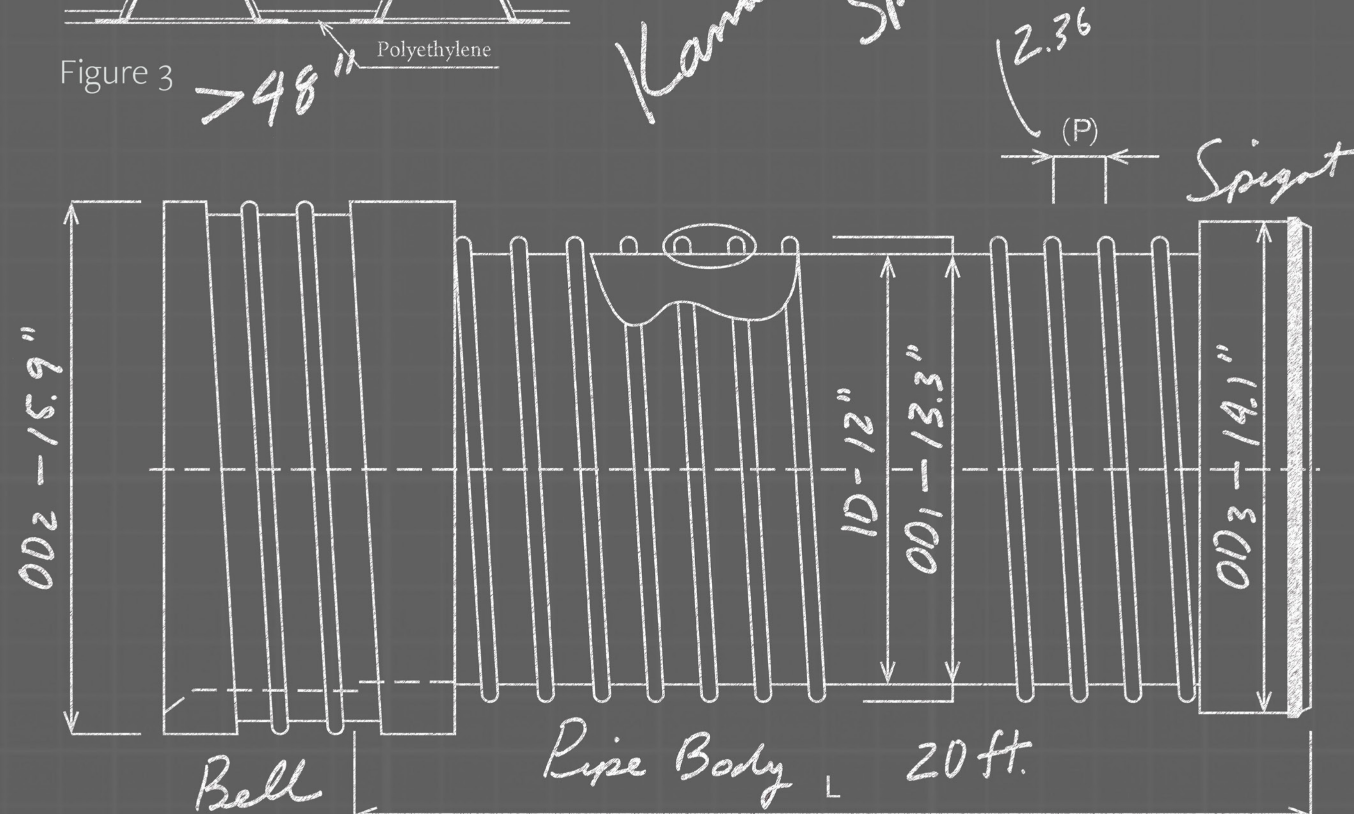


Figure 1

Important Notes

(This document is not intended to supersede project specifications)

1. This document provides the user/installer with the minimum requirements for proper installation of pipe. Non-adherence to these guidelines may result in damage to the pipe. Replacing damaged pipes during or after backfilling is an expensive and time-consuming process. It is recommended that all installers be familiar with this information. Contractors should inspect the pipe for distortion, damage and joint integrity as work progresses.
2. Care should be taken in handling of the pipe. Do NOT drop pipe and avoid any impact on the bell or spigot. Follow OSHA safety requirements to help always maintain a safe work environment.

Product Description

Kanapipe™ is an advanced pipe design combining the strength of steel with the unparalleled durability of high-density polyethylene. This Steel Reinforced Polyethylene (SRPE) pipe technology, combined with its high-performance bell & spigot joint rated for 20 psi, is used to build gravity fed sanitary and storm sewer systems, as well as stormwater management underground detention tanks. The pipe can also be used to build low-pressure irrigation transmission mains. You will find pipe dimension information in Fig. 1 and Tables 1 and 2 below.

Pipe and Joint Dimensions

Figure 1
Pipe Dimensions

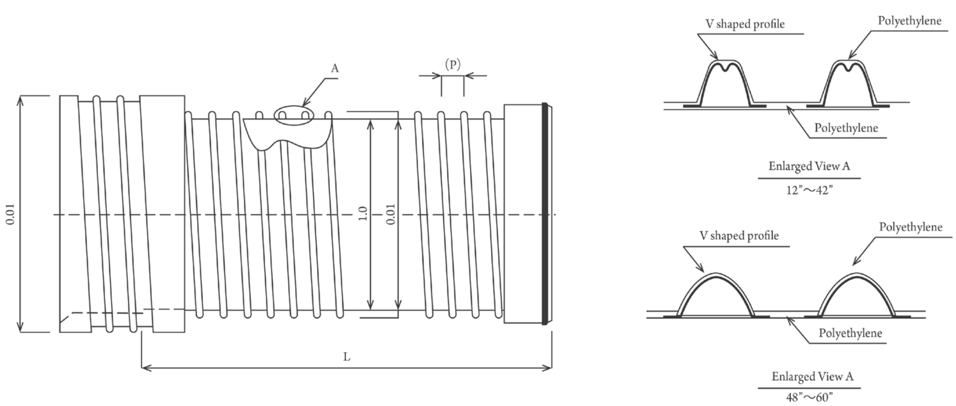


Table 2
Pipe Weights

Pipe Weight (lbs/ft)		
Pipe Size (in)	PE x PE	B x S
12	3.32	3.86
15	4.12	4.76
18	4.80	5.70
24	8.78	10.06
30	11.86	13.71
36	20.23	22.90
42	28.0	31.59
48	39.52	45.37
60	51.15	60.30
72	64.10	

Table 1
Pipe Dimensions

Nominal Diameter		Pipe Body						Pipe Joint	
		ID		OD_1		Pitch		OD_2	
inches	mm	inches	mm	inches	mm	inches	mm	inches	mm
12	300	12.0	305	13.3	338	2.36	60	15.0	380
15	375	15.0	381	16.3	413	2.36	60	18.1	460
18	450	18.0	457	19.3	489	2.44	62	21.3	540
24	600	24.0	610	25.7	653	2.76	70	27.6	700
30	750	30.0	762	32.2	817	3.54	90	34.5	875
36	900	36.0	915	38.2	970	3.94	100	40.6	1,030
42	1,050	42.0	1,067	44.4	1,128	3.94	100	46.9	1,190
48	1,200	48.0	1,220	52.0	1,320	6.30	160	57.7	1,465
60	1,500	60.0	1,524	65.2	1,656	7.68	195	70.9	1,801
72	1,800	72.0	1,829	77.2	1,961	7.68	195	—	—

Pipe Receiving and Unloading

Upon each pipe shipment arrival, said shipment should be inspected for any damage that might have occurred by the shipper and to ensure the accuracy of the shipment. All shipments will include a bill of lading and an adequate amount of pipe joint lubrication. The bill of lading should be compared to the shipped pipe, gaskets, and fitting. Any discrepancies or damage should be immediately reported to the transportation company representative at the time of delivery. Different pipe shipping configurations are presented in figures 2 to 5 below.

Figure 2
Single Large Diameter Pipe on a Flatbed

Figure 3
Nested Pipes Shipment on a Flatbed

Figure 4
Several Pipes Shipped via Trailer

Figure 5
Two Large Diameter Pipes on a Flatbed

Unloading Kanapipe and fittings should be performed in accordance with all OSHA safety requirements. The method of unloading pipe is ultimately the responsibility and decision of the customer. Equipment such as forklifts, cranes, cherry pickers or front-end loaders equipped with forks are traditionally used. All operators should be adequately trained for safe operation of the equipment and handling the load to avoid damaging the pipe.

Do NOT off-load pipe by dropping it from the trailer or truck bed. Furthermore, Dragging or dropping pipe from the truck, handling with a single chain or cable, or using forks directly on the inside of the pipe is not recommended and doing so will void any warranties. <u>When unloading nested pipes, only a specially designed lifting device should be used inside the pipe when unnesting.</u> Your Kanaflex representative or local distributor can assist you in procuring such a device.

When removing cargo restraints, such as tiedown straps, ropes or chains, extreme caution must be used. The load may have shifted during transport, which could result in pipe falling from the truck. If a forklift is used to remove pipe, the operator should exercise care to avoid running the forks too far under the pipe, since the forks may strike adjacent of pipe or push pipe off the opposite side of the truck. If a crane or front-end loader is used, it is recommended using a spreader bar with nylon (or synthetic) straps or protected cables to avoid damage to the pipe. When lifting the pipe, straps should be placed approximately 8 feet apart as shown in Figures 6, 7 and 8 below.

Figure 6
Recommended Lifting Configuration

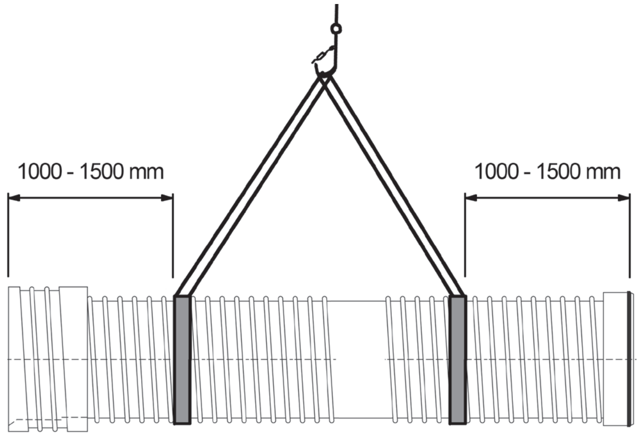


Figure 7
Field Example of Pipe Lifting

Figure 8
Using a Front-end Loader to Carry Pipe

Job Site Storage

Pipe should be stored on a flat surface. Construction site storage of pipe should be in a location that is out of the way of construction equipment. Palletized pipe should not be stacked more than two pallets in height. Individual pipe lengths should not be stacked in piles greater than 5 feet (1.6 m) high. When stacking pipe, make sure to alternate pipe direction to prevent bells from resting on adjacent bells and spigots on adjacent spigot. Securing chock blocks or other suitable methods should be used to prevent the stacked pipes from rolling. Figures 9 and 10 show examples of on-site storage.

Warning
Not adhering to these instructions may result in damage to the pipe or serious injury to people. Do not stand or climb on stacked pipe. Stand clear of pipe during unloading. Always follow project, local, state and OSHA safety requirements and rules.

Figure 9
Pipes Resting on the Ground

Figure 10
Pipes Resting on Wood Supports

Trench Construction

The trench width is determined based on the pipe diameter, backfill material, compaction equipment and in-situ soils. If the in-situ (or native) soils are unstable a trench box or other bracing, approved by the engineer, should be used for worker safety. Example of trench box use is shown in Figure 11. The width of the trench needs to be wide enough for a person to work safely within the trench. The minimum clear width between the pipe springline and the trench should be 1 foot. ASTM D2321 provides guidance for the proper use and movement of trench boxes. It is noted that improper movement of the trench box may disturb the compacted back fill and adversely affect pipe performance. General trench and embedment terminology and minimum trench widths are as shown in Figure 12 and Table 3 below.

Caution should be used when moving the trench box to make sure the pipe and its embedment are not disturbed. Movable supports should not be used below the top of the pipe zone unless approved methods are used for maintaining the integrity of embedment material. Before moving the trench box, place and compact embedment to sufficient depth to ensure protection of the pipe. As the box is moved, finish placing and compacting embedment.

Figure 11
Trench Box Example

Figure 12
General Trench and Embedment Terminology

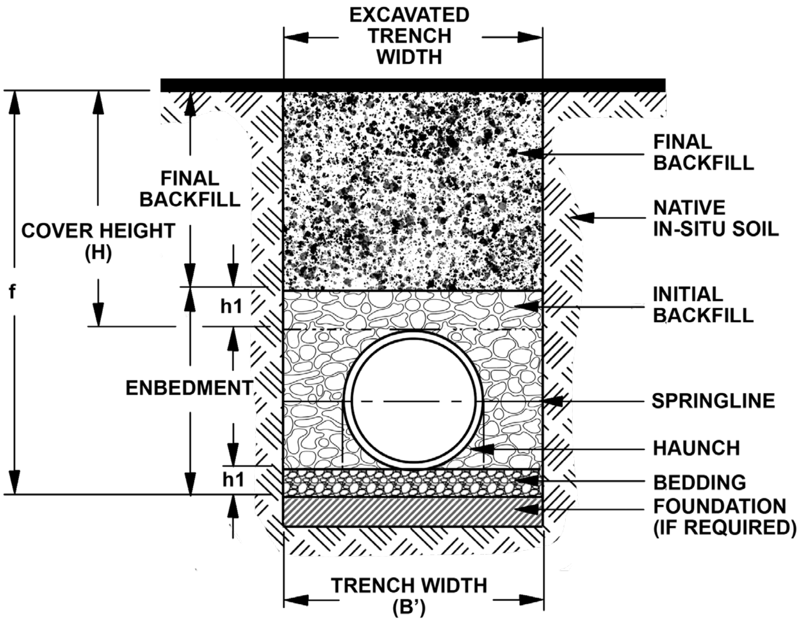


Table 3
Minimum Critical Dimensions for Trench Excavation

Note: As per ASTM D2321, minimum trench width shall not be less than the greater of either the pipe outside diameter plus 16 in. (400mm) or the pipe outside diameter times 1.25 plus 12 in. (300mm).

Minimum Critical Dimensions for Trench Installation		
Nominal diameter in (mm)	Trench Width B' in (mm)*	Bedding Height h1 in (mm)
12 (300)	29 (740)	6 (150)
15 (375)	32 (815)	6 (150)
18 (450)	36 (900)	6 (150)
24 (600)	44 (1100)	8 (200)
30 (750)	52 (1325)	8 (200)
36 (900)	60 (1500)	8 (0.20)
42 (1050)	68 (1700)	8 (200)
48 (1800)	77 (1950)	12 (300)
60 (1500)	94 (2370)	12 (300)
72 (1800)	109 (2750)	12 (300)

* Trench width usually depends on smallest bucket size available on site

Embankment Installation

Embankment installations require specific design parameters and dimensions for the construction of a structurally sound embedment of the pipe. Recommended critical dimensions are shown in Figure 13 and Table 4 below. In the event of an embankment installation, a backfill design should be prepared for the specific site conditions by the Engineer.

Figure 13
General Embankment and Embedment Terminology

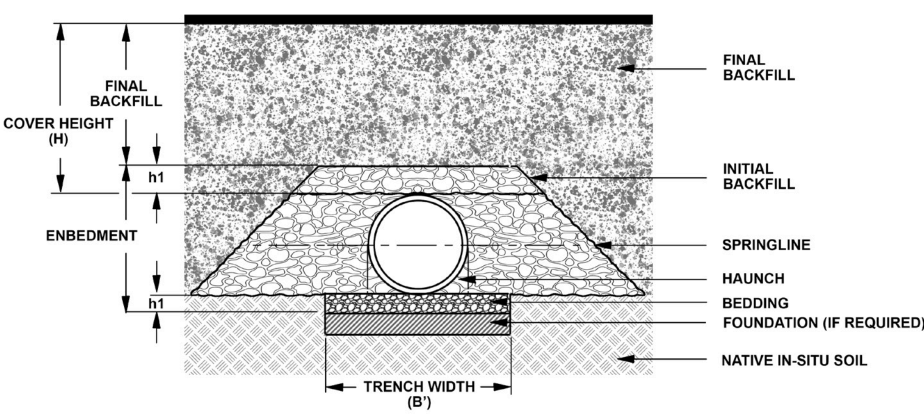


Table 4
Minimum Critical Dimensions for Embankment Installation

Minimum Critical Dimensions for Embankment Installation		
Nominal diameter in (mm)	Trench Width B' in (mm)*	Bedding Height h1 in (mm)
12 (300)	29 (730)	6 (150)
15 (375)	35 (900)	6 (150)
18 (450)	39 (1000)	6 (150)
24 (600)	51 (1300)	8 (200)
30 (750)	59 (1500)	8 (200)
36 (900)	63 (1600)	8 (200)
42 (1050)	71 (1800)	12 (300)
48 (1200)	87 (2200)	12 (300)
60 (1500)	102 (2600)	12 (300)
72 (1800)	120 (3000)	12 (0.30)

* Trench width usually depends on smallest bucket size available on site

Backfill

Backfill Material Selection

- As long as Kanaflex minimum requirements are met, engineered project documentation should take precedence.
- In-situ material may be acceptable for backfill use, but it must conform with the acceptable soil classifications in the Soil Classes Table of the ASTM D2321 Standard.
- Class I materials can be dumped around the pipe, taking care of eliminating voids by knifing the granular material under and around the pipe.
- Non-cohesive sans, sand/gravel mixes and other Class II and III materials shall be compacted to a minimum of 85% and 90% Standard Proctor density, respectively.
- Class III material should only be used in dry trench conditions where minimum densities can be achieved. Maximum particle size should not exceed 1.5".
- Class IV materials should be avoided unless authorized by the Engineer.
- Class V materials are not permitted.
- Flowable fill is an acceptable backfill, but care should be taken to avoid flotation or misalignment by anchoring the pipe or pouring the flowable fill in lifts. For more information on the used of flowable fill, consult Kanaflex Technical Bulletin KANTB-003 0324.

Dewatering

Should groundwater or surface runoff be present, dewatering of the trench is required and shall be performed so that the water level is maintained below the pipe bedding. A dry trench allows for proper placement and compaction of backfill. It also helps prevent pipe flotation or alteration in line and grade of the pipe. Typical methods for dewatering may include sump pumps, deep wells, well points, underdrains or a diversion ditch. Always consult with the project engineer for appropriate dewatering methods suitable to the site and project conditions. For additional information regarding pipe flotation consult Kanaflex Technical Bulletin KANTB-003 0324.

Backfill Envelope Elements Construction

Information below is provided as a basis to successfully backfill Kanapipe™. These represent the recommended best practices and reflect the minimum requirements from ASTM D2321. Project documentation should at least reflect these minimum requirements.

Foundations

The foundation material must be stable and capable of supporting the pipe installation. Unstable trench bottoms must be stabilized as directed by the engineer. If soft soil, such as peat or muck, is encountered, typical corrective measures are to remove and replace the soil in question with suitable bedding material. Additionally, if rock or unyielding foundation material is found, that material should be over excavated to approximately 12" and replaced with suitable foundation material, as directed by the engineer.

Bedding

The bedding material is placed in the bottom of the trench, to provide uniform support to maintain line and grade for the pipe. A loosely placed zone of bedding is placed in the middle 1/3 of the trench bottom whereas the outer 1/3 of the bedding is compacted. The bedding should be placed so that Kanapipe is at the correct grade when backfilled. The minimum recommended bedding thickness is four inches for 12”-36” (300 – 900 mm) diameter pipes and a minimum of six inches for 42”-60” (1050 – 1800 mm) diameter pipes. Recommended bedding material is a class I, class II or class III material as defined in ASTM D2321 and Table 5 below.

Table 5
Recommended Pipe Embedment Materials

PIPE EMBEDMENT MATERIALS						
ASTM D2321[1]		ASTM D2487		AASHTO M43 Notation	Min. Std. Proctor Density[2] (%)	Lift Placement Depth
Class	Description	Notation	Description			
IA	Open-graded, clean manufactured aggregates	N/A	Angular crushed stone or rock, crushed gravel, crushed slag; large voids with little or no fines	5 56	Dumped	18” (0.5 m)
IB	Dense-graded, clean manufactured, processed aggregates	N/A	Angular crushed stone or other Class IA material and stone/sand mixtures; little or no fines			
II	Clean, coarse-grained soils	GW	Well-graded gravel, gravel/sand mixtures; little or no fines	57 6 67	85%	12” (0.3 m)
		GP	Poorly-graded gravels, gravel/sand mixtures; little or no fines			
		SW	Well-graded sands, gravelly sands; little or no fines			
		SP	Poorly-graded sands, gravelly sands; little or no fines			
III	Coarse-grained soils with fines	GM	Silty gravels, gravel/sand/silt mixtures	Gravel and sand with <10% fines	90%	9” (0.2 m)
		GC	Clayey gravels, gravel/sand/clay mixtures			
		SM	Silty sands, sand/silt mixtures			
		SC	Clayey sands, sand/clay mixtures			
IVA	Inorganic fine-grained soils	ML	Inorganic silts and very fine sands, rock flour, silty or clayey fine sands, silts with slight plasticity		NR	
		CL	Inorganic clays of low to medium plasticity; gravelly, sandy, or silty clays; lean clays			
IVB	Inorganic fine-grained soils	MH	Inorganic silts, micaceous or diatomaceous fine sandy or silty soils, elastic silts		NR	
		CH	Inorganic clays of high plasticity, fat clays			
V	Organic or highly organic soils	OL	Organic silts and organic silty clays of low plasticity		NR	
		OH	Organic clays of medium to high plasticity, organic silts			
		PT	Peat and other high organic soils			

(1) Class III material should only be used in dry trench conditions where minimum densities can be achieved. Maximum particle size should not exceed 1.5”.
(2) Higher densities may be required as specified by the engineer.
(3) NR – Not recommended embedment material.

Haunching

The haunch is the area of embedment that extends from the bedding up to the spring line of the pipe. Getting adequate material into the haunch area, and compacting as necessary, provides a major portion of the pipe’s support against the soil and traffic loads. Poor placement and compaction of embedment workmanship, especially in the haunch area, will lead to excessive pipe deflection and grade and alignment problems. Haunching materials can be Class I, II, or III per ASTM D2321. Maximum lifts and compaction are shown in Table 4 above. As previously mentioned, special care must be taken to avoid disturbing the backfill in the haunch area when moving trench boxes.

When beginning the backfilling process, the embedment material should be distributed and compacted in lifts evenly on each side of the pipe to ensure that lateral loads on the pipe do not push it out of alignment. Dumping or “raining” embedment material with the backhoe bucket in the center of the pipe and allowing it to fall evenly on each side of the pipe results in evenly distributes backfill loads, which maintains pipe alignment in the trench.

Initial Backfill

Initial backfill extends from the spring line to a minimum of six inches (0.15 m) above the crown of the pipe. Initial backfill should be placed in lifts or layers. The maximum lift height is determined by the type of backfill material and pipe diameter. Lift heights should not exceed one half the pipe diameter or those as shown in Table 4 above. When using a material that requires compaction it is important not to use mechanical compaction equipment directly on the pipe itself.

Clean crushed stone may not require compaction but using a shovel to "knife" the crushed stone under and around the pipe in the haunch area to eliminate any voids is recommended. Other backfill materials require a greater level of compaction. Table 4 specifies the minimum level compaction, however depending upon the burial depth and the engineer's design the required level of compaction may exceed the minimum compaction listed in Table 4. The specific degree of compaction should be determined by the project engineer, or a geotechnical engineer based on the soil properties and burial depth.

Final Backfill

Final backfill extends from the initial backfill layer to the finished grade. For 8- to 48-inch (200mm-1,200mm) diameters the final backfill shall be a minimum of six inches (150 mm) and shall be a minimum of eighteen inches (450 mm) for 60-inch (1500 mm) diameter. This minimum depth of final backfill shall be measured from the top of the pipe to:

1. the bottom of flexible pavement; or
2. the top of rigid pavement.

When no pavement will be installed, but vehicle traffic is expected (e.g. gravel driveway), a minimum cover of 18" for 4- to 48-inch diameters and 30" for 60-inch diameters is recommended to minimize rutting. In non-trafficked applications native or in-situ material is suitable for final backfill.

Compaction of Backfill Material

The level of compaction will vary depending on the material and installation requirements. Proper selection of compaction equipment depends on the backfill materials. Table 6 provides basic information on the relative compaction efforts required for various types of backfill granular materials. Compaction methods will depend primarily on the amount of compaction, or modulus of soil reaction, required and the moisture level of the material. At optimum moisture levels, some Class II and III soils can be compacted to minimum recommended levels simply by walking on each backfill lift. While this technique may not be acceptable for all installations, the point is that compaction need not always require a great deal of extra effort or mechanical equipment. If, however, mechanical compaction equipment is needed in the backfill envelope or elsewhere on the site, the subsequent paragraphs provide guidance on compaction equipment and the soils for which they are most appropriate.

Vibrating Compactors

Vibrating compactors, as shown in Figure 14, are recommended for non-cohesive soils. When using vibrating compactors, care should be taken to avoid usage directly over the pipe.

Figure 14
Vibrating Compactor

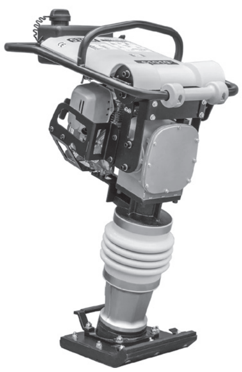
Table 6
Relative Compactions Efforts Required for Various Backfill Materials

Relative Compaction Effort for Backfill				
Soil Classification	Compaction Effort	Compaction Method or Equipment	Moisture Control	Maximum Lift
Class I	Low	Hand Knifing, Vibratory, or Impact	None	18"
Class II	Moderate	Vibratory or Impact	Remove standing water from trench	12"
Class III	High	Impact	Near optimum to minimize compaction effort	6"
Class IV	Very High	Impact	Near optimum to achieve required density	NA

Impact Compactors

Impact compactors, as shown in Figure 15, are recommended for cohesive soils and non-cohesive materials. Impact compactors are most effective when used with cohesive backfill materials. When using impact compactors, care should be taken to avoid contacting the pipe with the compaction equipment.

Figure 15
Impact Compactor



Vibration Roller

Vibration rollers, as shown in Figure 16, are recommended for cohesive soils and non-cohesive materials. Care should be taken to maintain a minimum separation distance from the pipe. Minimum separation distances will vary from 1-foot to 3-feet, depending on the size and weight of the vibration roller. Contact Kanaflex should you require specific guidance.

Figure 16
Vibration Roller

Laying Pipe

Prior to laying the pipes, they should be inspected to ensure they have not been damaged and that it is the correct type and size for the project. If the pipes are to be distributed along the trench alignment, the following precautions should be observed:

1. Lay pipe along the trench with the spigot in the direction of the lower or downstream direction.
   Note: Pipe should always be assembled with the spigot pushed into the bell. Never push the bell onto the spigot.
2. Place the pipe opposite the side of the trench where the excavated spoils will be deposited.
3. Place the pipe to protect it from traffic and heavy equipment. Additionally, if blasting is required for the project the pipe should be protected from blasts.

When lifting and lowering pipe onto the bedding, utilize a crane with two lifting points. A wide nylon sling is recommended (see Figure 1). Lifting the pipe by a single point may damage the pipe and is not recommended. Dragging the pipe into place should be avoided. Dragging can damage the pipe and void the warranty.

Bell & Spigot Joint Assembly

The Kanaflex pipe has one of the most robust joint designs in the industry, however proper joint assembly is critical to achieving the desired field performance. Figures 17,18 show a joint about to be assemble by a field crew. The following steps are necessary for proper joint performance:

1. Prior to lowering the pipe, the bell and spigot should be cleaned with a rag and inspected for any damage. Additionally, the protective film covering the gasket should be removed.
2. Place a home mark on the spigot of the pipe. The home mark should be placed a distance "L" from the end of the spigot. See Table 7 below.
3. Dig a bell hole in the bedding as shown in Figure 6 below. It is noted that the bell hole depth "h" should be 4-inches (100 mm) for 12" to 42" diameter and 6-inches (150mm) for pipe 48" and larger.
4. Once the pipe is lowered into the trench (as previously described), the inside of the bell and spigot gasket should be lubricated. Special attention should be paid to avoid letting the lubricated spigot come in contact with the bedding material. Bedding material may stick to the spigot, be dragged into the pipe joint and adversely affect the joint performance.
5. Assemble the joint by pushing the spigot into the bell. Never push the bell onto the spigot. Pushing the bell onto the spigot may scoop bedding material into the pipe joint and adversely affect the pipe joint performance.

6. Joint assembly should be accomplished using a come-along or other device to provide a controlled loading during the assembly process. A strap on the bell and spigot ends should be looped around the pipe and the come-along should be used to bring the two ends together. See Figure 19 below for an illustration of the come-along and strap configuration.
7. Once the pipe is joined come-along assembly is removed, the pipe joint must be inspected to ensure the pipe is completely homed.
8. Bell holes must be filled and compacted. Special attention must be given to placement and compaction of bedding material under and around the bell and spigot bell.

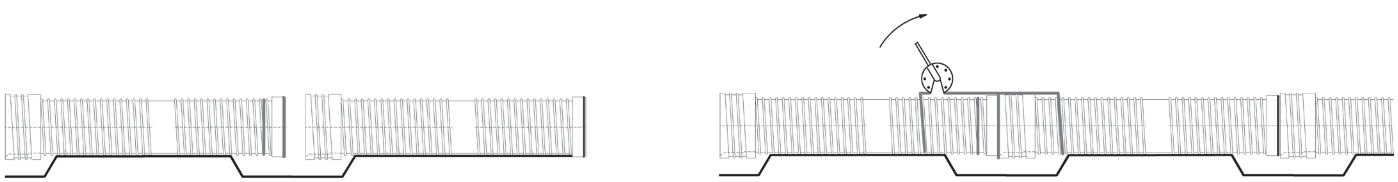
Table 4
Homing Mark Location Distances per Diameter

Homing Mark Location (L)	
Nominal Diameter	in (mm)
12" — 18"	5.8” (148)
24"	6.2” (158)
30"	6.6” (168)
36"	7.0” (178)
42"	8.9” (203)
48"	9.6” (245)
60"	12” (305)

Figure 17
Joint Assembly in the Field

Figure 18
Applying Lubricant to the Joint Spigot Prior to Insertion

Figure 19
Pipe & Spigot Joint Assembly with Bell Holes



Maximum Height of Cover

The maximum allowed heights of cover for Kanapipe™ SRPE pipes are outlined in Table 8.??????

AASHTO — Allowable Burial Min/Max (ft)										
Diameter	Class I		Class II			Class III			Class IV	
(inches)	Compacted	Dumped	95%	90%	85%	95%	90%	85%	95%	90%
12	69	37	54	37	35	38	30	27	27	25
15	59	30	47	30	26	30	22	18	18	16
18	50	28	45	28	23	29	19	15	14	12
24	62	27	45	27	22	29	20	16	16	14
30	42	25	38	25	23	23	17	13	13	11
36	27	22	25	22	19	23	15	11	10	8
42	41	22	25	22	22	23	15	11	11	9
48	31	18	25	18	16	18	12	9	9	8
60	28	19	22	19	12	16	11	8	8	7
72	21	13	16	13	9	12	8	5	5	4

For greater burial depths requirements, contact your Kanaflex representative.

Pipe Flotation

Steel Reinforced Polyethylene (SRPE) pipes offer a very distinctive advantage because of their lightweight. This is a very desirable feature, since it facilitates handling and installation of the pipes as well as reduces the wear and tear of installers and equipment. But this same quality makes SRPE pipes susceptible to flotation. It is worth noting that under the right set of circumstances in the field, all pipe products, such as concrete or metal pipes could be subject to flotation. Whenever the uplift on the pipe or structure exceeds the downward forces generated by its weight and the load it carries, the pipe or structure will rise or “float”. If flotation is a possibility when you design a project, then proper installation and/or anchoring of the pipe becomes an essential part of your design. For more information consult Kanaflex Technical Bulletin KANTB-003 0324 on Pipe Flotation

Pipe to Manholes/Structures Connections

Pipe end connections to manholes and other concrete structures allow for grouting using a non-shrink grout, or other methods specified by design plans, or in accordance with ASTMD2321. Kanapipe™ can connect to manholes and other structures using typical methods applicable to other flexible pipe products. Consult with the project Engineer or with Kanaflex to discuss what method is most suitable for your specific project. Figure 20 shows typical grouted connections performed in the field.

Figure 20
Typical Grouted Connections in the Field

Fittings

Kanaflex offers a complete selection of fittings for Kanapipe™. Fittings are available for pipes from 12”-72” (300-1800 mm) diameter and include couplers, bends, tees, wyes, risers, reducers, and manifolds.

Figure 21
Example of a Fabricated Fitting for Kanapipe™

Cutting Instructions

It will sometimes be necessary to cut the pipe in the field to meet project installation requirements. The recommended cutting tool for Kanapipe™ is a chop saw or and abrasive saw blade. Always refer to the saw manufacturer for detailed operating instructions and additional information. We provide below some basic requirements:

1. The blade thickness should be no less than 1/8” and recommended to be made of 2 ply material similar to what is used to cut ductile iron pipe.
2. Use the leading edge of the blade to cut into the pipe’s corrugations.
3. Bury the blade as much as possible into the pipe as you proceed.

Always wear proper personal protection equipment when cutting Kanapipe™

Field repairs

Should a section of pipe sustain damage at any point during installation, the project Engineer should be contacted immediately. For large damaged sections, cut out the damaged segment and cut a length a replacement pipe to fit in its place. Just like any other flexible pipe products, Kanapipe™ can be coupled using various industry standard methods and materials such as concrete collars, Mar Mac©, Fernco© or approved equal.

In the case of smaller abrasions or exposed steel, an approved rubberized coating spray can be used to covert the exposed area.

Lateral Connections

Kanapipe™ can be procured with prefabricated fittings specifically designed for lateral connections once pre-fabrication drawings have been reviewed and approved by the project Engineer and the contractor.

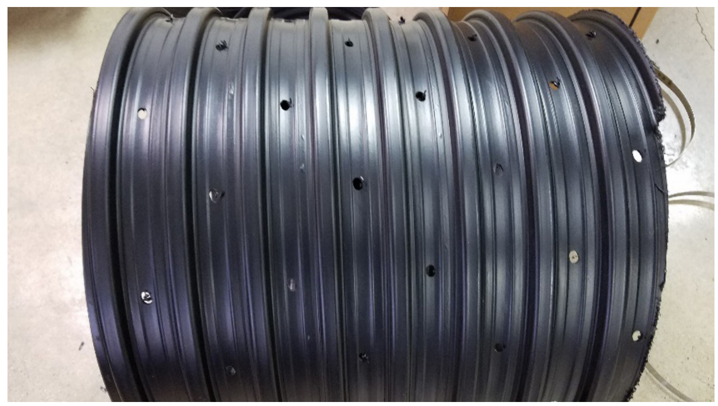
Lateral connections can also be performed in the field using currently available products for drainage applications, such as those offered by Inserta Tee™ or approved equal. Figure 22 provides an example of the type of lateral connections that can be done in the field.

Figure 22
Typical Lateral Connection Field Installation

Perforated Pipes

Should your project contain specific requirements about capturing underground water to help lower the water table level; Kanapipe™ can be ordered with perforations. Done in our factory, the hole perforation process will match the pattern that has been requested by the project Engineer. Figure 23 shows a perforated Kanapipe™ sample. Installation requirements for perforated pipes are similar to those for regular pipes. Non-woven geotextile will have to be wrapped around the pipe prior to proceeding with backfill.

Figure 23
Example of Perforations on Kanapipe™



Post Installation Testing

Your project will certainly require post-installation testing prior to final acceptance to demonstrate the pipe was installed properly and will perform in accordance with the project's requirements. Kanapipe™ is a flexible pipe material and must be subject to post installation testing applicable to flexible pipe systems.

Post installation testing of flexible pipes may include deflection testing and leak testing. It is recommended that deflection testing takes place after the final backfill and compaction has been in place at least 30 days and prior to putting the pipe in operation.

A recommended sequence of testing for sewer systems follows, but please note that the utility or the design engineer may have spelled out the post installation testing in the project's documents.

1. Cleaning and flushing with high-pressure water blasting
2. Deflection testing
3. Water-tightness (leakage) testing
4. Closed Circuit Television (CCTV) testing with or without laser profiling[1]

Notes: 1. CCTV and Deflection testing can be performed simultaneously.

For more information on post installation testing consult Kanaflex Technical Bulletin KANTB-005 0324.

Additional Guidance

This Kanapipe™ Installation Guide is intended only as a summary of existing best practices and standards requirements for proper installation. Additional guidance can be found in the following industry practices and standards:

- ASTM D2321 "Standard Practice for Underground Installation of Thermoplastic Pipe for Sewers and Other Gravity-Flow Applications"
- ASTM F2435 "Standard Specification for Steel Reinforced Polyethylene (PE) Corrugated Pipe"
- ASTM F2487 "Standard Practice for Infiltration and Exfiltration Acceptance Testing of Installed Corrugated High Density Polyethylene and Polypropylene Pipelines"
- ASTM F1688 "Standard Guide for Construction Procedures for Buried Plastic Pipe"
- CSA B182.11 "Standard practice for the installation of thermoplastic drain, storm, and sewer pipe and fittings"

Any discrepancies between this installation guide and the above-referenced standards and practices should be brought to the attention of Kanaflex Corporation prior to proceeding with installation. It is noted that this installation guide is not intended to supersede the procedures established by the design engineer for a specific project or site condition.

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KANTB-008 0324