

# Perfect Pipe Installation Guide HDPE-Lined Reinforced Concrete Pipe





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# SECTION 1

This document provides contractor a guideline to handle, store, install and inspect Perfect Pipe on site in order to protect the two main features of Perfect Pipe: the interior liner and the pipe joint. Perfect Pipe installation also involves a general operation procedure, please follow project specification on excavation, soil stabilization, backfilling, and control of groundwater and surface drainage. Adequate knowledge of subsurface conditions is essential for any type of excavation. However, these are outside the scope of this guide.

## SECTION 2 Definitions

Barrel	The body of the pipe.
Bell	The female end of the pipe.
Coupler	A black plastic cylinder made of polypropylene which house two double tilting gaskets used to connect the pipes. The coupler is factory installed in the bell end of the pipe.
Gasket	Double tilting gasket rest on the coupler provides hydrostatic pressure resistance.
Liner	High density polyethylene yellow liner with anchors cast into concrete, covering entire interior surface.
Load Transmission Ring	The rubber ring rests at the spigot protecting from concrete to concrete impact.
Spigot	The male end of the pipe.





### SECTION 3 Pre-Installation

In addition to the project plans, installation direction, site conditions and conventional open cut construction plans, contractor shall review the following technical information regarding to Perfect Pipe prior to the installation:

- Product drawing
- Product specification
- Product installation guide

Plan for the required equipment to handle, area for storage, bunking, and protection for cold weather. Meeting with Geneva Pipe and Precast technical representative prior to the installation is highly recommended, especially if the construction crew working with the Perfect Pipe system for the first time.

## SECTION 4 On-site Handling

#### 4.1 SAFETY PRECAUTION

A competent person designated by the contractor should inspect all lifting assemblies and attachment hardware prior to each use. Any damaged or defective lifting equipment must be immediately removed from service. All other safety procedures and recommended operating practices by the manufacturer of commercial lifting equipment must be followed. Failure to observe the above warnings may lead to property damage, personnel injury or death.

#### 4.2 REASONABLE CARE

Perfect Pipe shall be handled with a reasonable care. The contractor must take all necessary precautions to ensure the method recommended in this guide is being followed. When moving the pipe, avoid contacting another pipe or hard object such as trench box etc.

#### 4.3 LIFTING DEVICE

All Perfect Pipes are designed with two swift lift anchors except the spigot to spigot adapter. When handling the pipe, use both swift lift anchors with maximum sling angle not exceeding 60 degrees. The extended lip of the swift lift eyes shall be pointed inward.





#### 4.4 HANDLING EQUIPMENT

The following are recommended handling equipment:



Crane



#### Excavator

Extra care shall be exercised when handling with an excavator. Transporting the pipe shall be done in a manner that prevents excessive impact or dynamic loads.



#### Forklift

Perfect Pipe can be handled with care by forklift using the swift lift anchors.

#### 4.1 DON'T



- It is not recommend to use a front-end loader. Traveling through an uneven construction site may results in pipe damage.
- Do not drag pipe on the ground.
- Do not roll pipe over the ground.



## SECTION 5 Receiving

#### 5.1 VISUAL INSPECTION

Perfect Pipes delivered to a job have gone through substantial quality control process. All pipes shall have identification indicating QC pass and product label identifying product size, class and manufacturing date. Contractor shall visually inspect the product for any potential deficiency listed below. These deficiencies are not uncommon due to handling and transportation activities between the factory and the job site. Report to your Geneva Pipe and Precast representative if any of the following is observed:

- Check if the coupler is missing, damaged, cracked
- Check the coupler position the coupler has to be positioned fully inside the bell equally all around to avoid damage of the coupler and gasket during handling and storage and to ensure proper homing of the pipe during the installation.
- Check if the gasket is missing from the coupler
- Check if any concrete damage e.g. chipped, spalled, cracked
- Check if any scratch or other damage on the surface of the liner
- Check if the load transmission ring is missing

#### Figure 1: Improper vs. proper coupler position.





#### 5.2 UNLOADING

Use the swift lift anchors to unload the pipe. Do not make contact to the inside of the pipe or the coupler by any construction equipment. This may cause potential damage to the liner and compromise the durability and performance of the pipe.



24 — 36 inch

48 inch

#### 5.3 DAMAGE

If Perfect Pipe is damaged during delivery and unloading, the pipe shall be set aside. Refer to *Section 10: Deficiency and Repair* for disposition decision.

### SECTION 6 Storage On Site

Perfect Pipe shall be stored on a flat surface, such as aggregates or soil, in a single layer. It is recommended to use 4x4 bunking wood perpendicular to the pipe. Do not stack the pipes. Keep the pipes as close to the installation location as possible, protected from traffic and construction equipment.

The pipe shall be wedged to avoid rolling and direct contact with the adjacent pipe. Alternate the spigot and bell of the pipe to avoid direct contact against the adjacent pipe.





## SECTION 7 Installing Pipe

#### 7.1 PREPARATION

Before final placement, contractor shall:

- Re-inspect the pipe in accordance with Section 5.1.
- Ensure the coupler and the inside of the bell and the inside of the spigot are free of any foreign objects such as dirt, soil, ice, snow etc.
- Ensure the load transmission ring is resting in the recess at the spigot.
- Lubricate the outside of the coupler and the inside and outside of the spigot. Only Perfect Pipe lubricant is recommended to facilitate proper homing. If other lubricant is to be used, verify that the ingredients are identical.
- For cold weather conditions make sure that the Perfect Pipe lube is stored indoors in the warm area until it's ready to be used. The colder the conditions the more important is a diligent usage of the lubricant.



**Figure 2:** Perfect Pipe coupler lubricant and label instructions. Keep lubricant in a warm area until ready to install.



#### 7.2 INSTALLATION

Lift the pipe into the trench using swift lift into the trench. Perfect Pipe shall be slowly lowered into the final depth leaving enough space to the adjacent pipe to avoid any damage.



Carefully move the pipe into the direction of the adjacent pipe. Before the insertion into the bell the pipe has to be aligned completely horizontal and fully centered to the coupler. Stop the Insertion process before making contact with the coupler.

Once in the position, contractor can home the pipe using the following methods. Make sure that the bell excavations are properly prepared.



Home the pipe using a pry bar. Keeping the pipe suspended with lifting sling, use pry bar to push the pipe home. To avoid damages of the bell of the pipe, place a block of wood between the bar and the concrete horizontally.



Connect lifting slings to the lifting pins closest to the spigot end of the adjacent pipe and the lifting pin next to the spigot end of the pipe being homed. Make sure that adjacent pipe can't move during the insertion process. Carefully lift the sling and let the gravity push the pipe into place. Homed Perfect Pipe shall not bounce back. In case the pipe is bouncing back, remove the pipe and inspect the coupler, gasket, load transmission ring and spigot end. Make sure every part is free of damage and in the correct position. If so, lubricate the joint and the inside of the spigot again and home the pipe. If not, set that pipe aside and contact Geneva Pipe representative to determine whether the pipe can be used. Use another pipe joint instead.

Do not use any other equipment such as bucket of the excavator to push the pipe in place. This will damage the joint.



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# SECTION 8 Joint Validation

#### 8.1 EXTERIOR

After homing the pipe, contractor shall immediately inspect the joint. Unlike conventional concrete pipe, the pipe joint does not have a flush face on the spigot shoulder.



#### 8.2 JOINT GAUGE

By design, the distance between the pipe shall be 0.197" (5 mm). The maximum allowable joint gap is 0.394" (10 mm) without compromising the hydrostatic performance. A diagram of the joint measurement tool is provided in Figure 5. One side of the tool is sized to measure the minimum design joint gap and the other is to measure maximum permissible joint gap.



**Figure 4:** Unacceptable Joint Gap, exceeds max allowable gap to seal joint properly

## 8.3 RISKS

The hydrostatic performance depends on the joint of the pipe. Failing to validate the joint during installation increases the risk of leakage.



## SECTION 9 Installation in Winter

#### 9.1 WINTER PROTECTION

Adequate winter protection shall be exercised to avoid excessive built up of snow or ice. Contractor is recommended to elevate dunnage, cover the pipe, especially both end face with tarp if substantial snow fall or freezing rain is expected.

#### 9.2 ADDITIONAL INSPECTION

Before the installation, the joint of the Perfect Pipe including the inside face of the pipe, the coupler, and the inside face of the spigot shall be inspected. Snow and ice shall be removed. The joint shall be de-iced using the following method:



- Use frost buster to warm up the pipe / join, suitable and protective for the EPDM gasket.
- Remove the ice using non-metallic scraper
- Wiggle the gasket on the coupler. An unfrozen gasket shall allow minor movement.
- For cold weather conditions make sure that the perfect pipe lubricant is stored indoors in a warm area prior to usage.

#### 9.3 UNACCEPTABLE CONDITIONS



Ice build-up and frost in the load transmission ring.



Ice build-up on inside of the spigot.



Ice build-up on inside of the bell.



## SECTION 10 Product Deficiency and Repair

The key elements for Perfect Pipe are the liner and the coupler. Any damages impacting the quality of the liner and coupler shall be noted by the contractor. The pipe with such damage shall be removed from the installation. Table 1 provides a general guide for remediation on site. If the situation causes any uncertainty to the performance of Perfect Pipe, contact an Geneva Pipe and Precast technical representative.

#### **Table 1:** Common Damage and Remediation

Damage	Remediation	
Concrete damage with area that is smaller than 150 mm by 150 mm with depth less than 13 mm. No expose steel and no separation between liner and concrete are observed.	Patch with non-shrink cementitious material such as Rapid-Set Mortar Mix or approved equal.	
Concrete damage at the bell with area that is smaller than 300 mm by 300 mm with depth greater than 13 mm. Expose steel but no separation between liner and concrete are observed and no damage to the coupler.	Patch with non-shrink cementitious material with minimum 28-day strength of 6,000 PSI. Repaired section must be properly cured to minimum 6,000 PSI prior to installation.	
Concrete damage (anything beyond the above mentioned scenarios)	Further assessment by Geneva Pipe and Precast technical representative is required.	
Cracked pipe	Further assessment by Geneva Pipe and Precast technical representative is required.	
Gasket damaged	Replace gasket, lubricate the coupler seal seat circumferentially before installing the gasket. Contact Geneva Pipe and Precast if assistance is necessary.	
Coupler damaged	Return and replace the pipe. Removal and replacement of the coupler on site is not recommended.	
Load transmission ring damaged	Replace load transmission ring.	
Liner damaged or scratched	Further assessment by Geneva Pipe and Precast is required. Depending on the damage level either repair of the patch or full pipe replacement.	
Liner black mark	Inspect carefully the surface of the liner. If no scratch or stretch, the pipe is acceptable.	
Coupler is not in the correct position inside the bell.	Return and replace the pipe. Removing and replacing the coupler on site is not recommended.	







