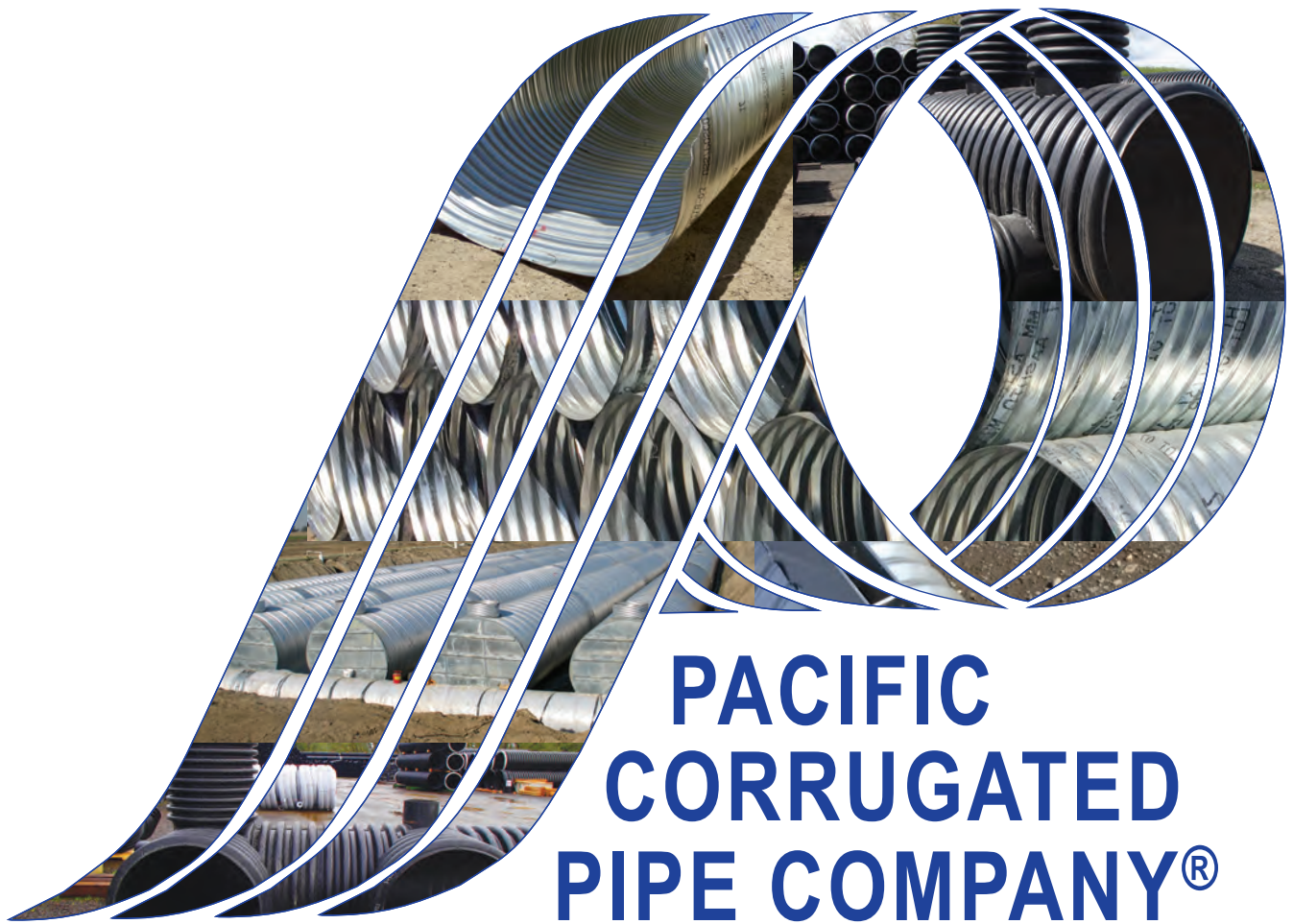




Receiving, Handling & **Installation Guide**

High Density Polyethylene (HDPE)
Corrugated Pipe



**PACIFIC
CORRUGATED
PIPE COMPANY®**

“Caring for our customers with local market service
and expertise since 1935”



Pacific Corrugated Pipe Company has been leading the drainage industry since 1935.



STATEMENT OF INDUSTRY PRACTICES

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Products produced by Pacific Corrugated Pipe Co. (“PCP”) are marked with the relevant applicable standards to which they conform so that purchasers can clearly understand the quality and grade of materials being provided. Listed below are specifications commonly used within the corrugated HDPE pipe industry. Specifications can have multiple editions and are revised from time to time. The markings on pipe products indicate conformance to the latest edition and revisions of such standards as of the date of production.

AASHTO M 252 - Standard Specification for Corrugated Polyethylene Drainage Pipe 3”-10” (75mm to 250mm)

AASHTO M 294 - Standard Specification for Corrugated Polyethylene Pipe, 12”-60” (300mm to 1500mm)

ASTM F 405 - Standard Specification for Corrugated Polyethylene (PE) Pipe and Fittings, 3”-6”

ASTM F 667 - Standard Specification for 8 through 24 inch Corrugated Polyethylene Pipe and Fittings

ASTM F 2306 - Standard Specification for 12 to 60 inch (300mm to 1500 mm) Annular Corrugated Profile-Wall Polyethylene Pipe and Fittings for Gravity-Flow Storm Sewer and Subsurface Drainage Applications

ASTM F 2648 - Standard Specification for 2 to 60 inch (50 to 1500mm) Annular Corrugated Profile Wall Polyethylene (PE) Pipe and Fittings for Land Drainage Applications (virgin and recycled resins)

ASTM D 2321 - Standard Practice for Underground Installation of Thermoplastic Pipe for Sewers and Other Gravity-Flow Applications

ASTM D 3350 - Standard Specification for Polyethylene Plastics Pipe and Fittings Materials

ASTM F 477 - Standard Specification for Elastomeric Seals (Gaskets) for Joining Plastic Pipe

ASTM D 3212 - Standard Specification for Joints for Drain and Sewer Plastic Pipes Using Flexible Elastomeric Seals

There are many other national and local standards that may be applicable to corrugated polyethylene pipe products. We welcome your questions about the specifications listed above or other related specifications.





SAFETY PRECAUTIONS

Responsibility for the establishment and implementation of appropriate safety and health practices while handling, storing, and installing PCP pipe lies with the user of this product. Please consult with OSHA for compliance with occupational safety and health standards under the OSH Act. Depending on job site conditions and regional standards, additional safety precautions may also be required.



18" pipe stored in 20 piece bundles



Stacking pipe for temporary storage



Alternate and offset layers of stacked Bell & Spigot pipe

I. RECEIVING AND HANDLING

VISUAL INSPECTION

PCP takes great pride in ensuring product quality and order accuracy. Our StormTite™ pipe is generally shipped in bundles, and we utilize dunnage and bands when appropriate to protect the quality of PCP pipe during the shipping and handling process. Pipe may also be shipped nested when orders are placed for multiple diameters. Sometimes nesting is also referred to as telescoping. Loads should be checked visually before unloading. Discrepancies and/or damages observed must be reported immediately.

UNLOADING

Ensure that the delivery truck is parked on level ground. Pipe should never be rolled or pushed off a truck. Appropriate unloading equipment may include a forklift equipped with lifting tongs and rated for associated capacities and/or lifting equipment with wide web choker slings. Avoid directly contacting chains with pipe to prevent corrugation damage. Trained staff should follow equipment user manuals while utilizing unloading equipment in order to avoid damage or injury. PCP cannot be held responsible for damages incurred due to the improper handling of its products.

STORAGE

Set aside one or multiple staging area(s) as needed to temporarily store PCP StormTite™ pipe at a job site. Ensure that such area is level, out of the way of construction traffic, and free of large rocks, rough surfaces, and debris to protect pipe against physical damage before installation begins. Pipe that arrives packaged in bundled units may be stored in such units, while individual loose pipe may be stacked in rows. Block the base row of individually stacked pipe on both sides to prevent movement and/or collapse. Stack pipe according to size and reduce each consecutive layer by one pipe. Limit pipe stacks to a maximum height of six feet and refrain from climbing on stored pipe to prevent damage and/or injury.

STORING BELL AND SPIGOT

In addition to the previously noted storage guidelines, special care should be taken when transferring and storing PCP StormTite™ bell and spigot pipe in order to protect the bell and the gasket. Do not drop, drag, or push pipe ends during handling as this may deform the bell or roll the gasket. Avoid stacking bells on top of each other by alternating the direction of the pipe lengths with each stacked layer (see image at left). PCP bell and spigot gaskets are wrapped at our factory for extra protection against improper handling and UV exposure-related deterioration. Gaskets are best protected during storage by offsetting each layer of pipe so that the gasket is positioned between pipe corrugations.

WEATHER CONSIDERATIONS

All PCP StormTite™ pipe contains at least 2% carbon black as protection against UV deterioration and is suitable for outdoor storage; however, special care should be taken when temperatures drop to near or below freezing. Under these conditions the flexibility of the pipe is reduced which increases its vulnerability to damage from improper handling (such as the accidental dropping of pipe or impact from objects hitting the pipe).

STRINGING PIPE

In order to save handling time, pipe may be strung along an open trench's right of way on the side opposite of excavated trench material in preparation for laying the pipe. Position the pipe on a level surface and out of the way of equipment and/or crew. Utilize restraints as necessary to keep pipe from rolling before installation. It is important to leave space between each length of pipe in order to protect pipe ends while stringing. Bell and Spigot pipe should be strung with the bell end pointing forward or upgrade.



II. INSTALLATION



Damaged pipe, marked and set aside.

PIPE INSPECTIONS

Before beginning the installation process a final inspection of all HDPE pipe stored at the job site is highly recommended. Pipe that is found to be damaged due to improper handling and/or storage should be rejected for use, set aside, and marked as rejected. Pipe that has been damaged cannot be used in pressure tested installations.

INTRODUCTION

HDPE corrugated pipe is considered flexible in nature. Installed HDPE, produced in either recycled or virgin material, interacts with its surrounding embedment and the combination of the pipe-soil structure, appropriately back-filled, is capable of supporting the weight of earth fills and surface loads. A successful and dependable drainage installation depends on adherence to industry standards, proper handling of materials and equipment, and attention to detail during the entire installation process. The proper compaction of back fill material around the pipe can only be achieved by maintaining best practice industry standards during the installation process. ASTM D 2321 ("Standard Practice for Underground Installation of Thermoplastic Pipe for Sewers and Other Gravity-Flow Applications") provides detailed information on such topics as trench excavation, placement of pipe, bedding, backfill, and deflection control. Ensure that all installation practices comply with federal, state, and local codes and regulations. PCP manufactures StormTite™ in both type C - single wall with a corrugated interior and exterior, and Type S - double wall with a corrugated exterior and a smooth interior wall. Type-S pipe is available with a plain end or an integral bell and spigot system which has been certified by independent third party laboratories to meet the "watertight" requirements defined in ASTM D 3212.

INITIAL PREPARATION

- Perform a final inspection of the pipe to ensure that pipe is in good condition. Damaged pipe cannot be relied upon in pressure tested installations or critical applications.
- Move the pipe into the trench, using the proper necessary equipment with padding or nylon strap slings. Re-inspect pipe after it has been lowered into the trench and before starting the pipe joining phase. Never dump, drag, or roll pipe into a trench.

INSTALLATION OF PLAIN END PIPE

- Plain end pipe installations usually require a soil tight system and this is accomplished with split couplers to join plain end pipe and/or plain end fittings.
- Keep pipe ends, fittings, and split couplers clean in preparation for the pipe joining process.
- Place pipe sections in proper alignment and wrap the split coupler around the joining pipe ends. Secure split coupler 8" and up with the zip ties provided. Smaller diameter split couplers may be secured with tape.

SECURE PIPE

Secure pipe against movement and tightly seal open ends of installed pipe when halting the pipe laying process. This will prevent creep and accidental introduction of unwanted substances (dirt, sand, grit, mud, debris, animal waste, etc.) into the pipe.

INSTALLATION OF BELL AND SPIGOT

- PCP recommends starting downstream and moving upstream while laying pipe. Bells should face upstream when stringing pipe along the pipe trench and/or when moving pipe into the trench. It is inadvisable to face the bell end downstream at the start of the run as this will result in the bell scooping up dirt and foreign matter during the pipe joining phase and this will compromise the pipe joint.
- The entire joint surfaces (the bell end and the spigot end) must be clean and free of any dirt, sand, grit, mud, or other foreign harmful substances. Any foreign matter can prevent an effective seal between the gasket and the bell.

(continued)



18" and 24" StormTite™ Plain End Pipe, 30' length



Bell end of 24" PCP StormTite™



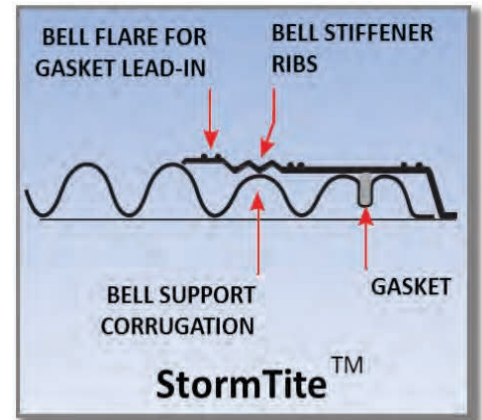
COMPACTION

It is recommended to use small, hand-held or walk-behind compactors for compaction of backfill material. Never use mechanical equipment directly on the pipe during compaction of backfill and take care to avoid deflecting or damaging the pipe. A deflected joint will not hold pressure.



A properly lubed gasket

- Gaskets are installed at our factory and are stored and shipped with a UV protective wrap. Remove the wrap immediately prior to lubrication and installation.
- Ensure that the gasket is properly oriented and seated in its groove. Take care to prevent the gasket from rolling or becoming dislodged from its groove.
- The joint surfaces must be coated with lubricant to reduce friction while assembling the joint. Lubricate the inside bell and the gasket with a thin and even layer of lubricant using a clean brush, sponge, cloth, or gloved hand as necessary. Dry and un-lubricated areas can cause leakage.
- Once lubricated do not allow the bell and spigot ends to come into contact with dirt as this will compromise the assembly process and joint performance. Should contamination occur; (1) remove and clean the gasket; (2) re-install and re-lubricate the gasket; (3) clean and re-lubricate the interior of the bell. (See diagram)
- **Verify the proper “homing” position for the pipe joint by measuring the depth of the bell end and placing a mark on the correct corrugation of the spigot end.** A properly installed pipe joint will have the gasket aligned within the wide and smooth gasket seating area portion of the bell. (See diagram)
- Place pipe sections in proper vertical and horizontal alignment and keep pipe level. To make the connection, push the spigot end into the bell. Use equal lateral pressure until the gasket is properly positioned. Visually monitor the moving spigot and corresponding protrusion created by the gasket to ensure that the gasket does not roll out of position while pipes are being pushed together. Do not “over-home” the pipe as an over-assembled pipe joint might be compromised and leak.
- Smaller diameter pipe may be joined manually.
- For large diameter pipe use a push-plug of matching diameter while joining pipe to avoid damaging the bell end of the pipe. Never push directly against the bell end of a pipe. Push-plugs may be available from PCP, or can be made in the field by cutting a spigot end of pipe in the same diameter and about three feet in length (or at least five corrugations). See instructions for field cutting pipe.
- Place the push-plug into the upstream facing bell end of the uninstalled length of pipe and push against the push-plug until the spigot end of the pipe moves into the bell end of the downstream pipe (see Initial Preparation). Continue pushing until the pipe reaches the “homing” position.
- A variety of methods can be used to connect pipe: The bar and block method (for pipe up to 18”), the excavator method, or the excavator and sling method (for pipe 24” and greater). Please contact your PCP rep for additional information.
- Any pipe damaged in the joining process must be removed and replaced.
- If pipe must be misaligned in line or grade, do not attempt to do so until after the pipe assembly is complete. See Curved Pipe Systems.
- Secure pipe against movement and tightly seal open ends of installed pipe when halting the pipe laying process. This will prevent creep and accidental introduction of unwanted substances (dirt, sand, grit, mud, animal waste) into the pipe.
- Ensure that proper backfill material is used and that it is free of debris, clay, frozen clumps, organic matter, and rocks.





Cut in valley of corrugation



FIELD CUTTING

- When field cutting becomes necessary, cut pipe to length before laying it in the trench.
- Utilize a hand, cable, or reciprocating saw.
- Always ensure that the cut is made in the valley between corrugations. Never cut through the pipe corrugations as this will compromise pipe integrity.
- Visually inspect the saw cut and remove any trim burrs to maintain joint integrity.
- Appropriately seal any vent tubes opened by the saw.

TRANSITIONS

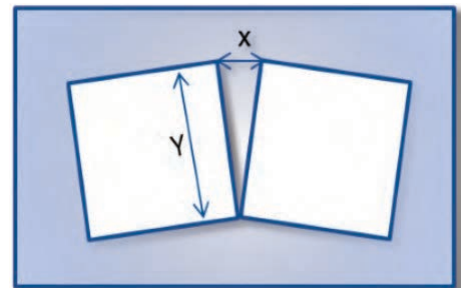
Your Pacific Corrugated Pipe Company representative can serve as your resource for discussing pipe transitions. With the appropriate accessories, HDPE pipe can be connected to manholes and catch basins or pipe of different dimension or materials. A variety of soil or watertight configurations are available to ensure optimal joint performance and their application depends on the nature of the project. Job specifications and local codes and regulations should guide the decision making process towards applicable solutions.



PCPP manufactures fittings for use in pipe transitions.

CURVED PIPE SYSTEMS

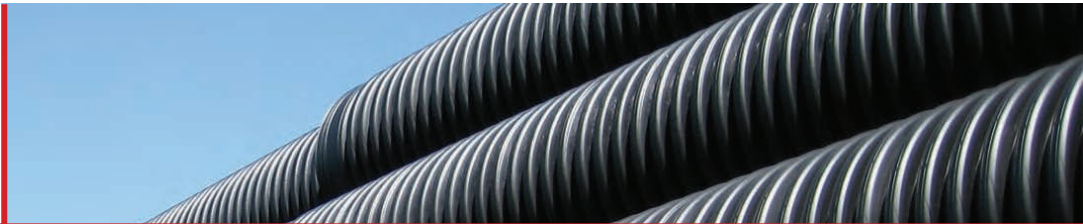
Occasionally a gradually curved pipe system is preferred to a system that utilizes fittings. PCP StormTite™ may be able to accommodate minimal angular misalignment which can only be obtained at the pipe joint. Certain criteria for bending radius must be controlled during the installation process. When intentionally misaligning joints for a curved pipe system, maximum recommended angular misalignment is two (2) degrees. The degree of misalignment can be calculated by determining the difference in gap width between the narrowest and widest points of the joint and comparing that difference to the diameter of the pipe diameter according to the following formula:



Welded reducers used in a storm water detention application

X = gap differential
Y = pipe diameter
Tan Ø = X/Y
Ø = 0.0349 (the 2 Degree angle of misalignment expressed in Inches)
→ X = Y times 0.0349"

Diameter	Ø (Maximum 2 Degree Angle of Misalignment)	Maximum Gap Differential Allowed
8"	0.0349	0.2794"
10"	0.0349	0.3492"
12"	0.0349	0.4188"
15"	0.0349	0.5238"
18	0.0349	0.6286"
24"	0.0349	0.8381"
30"	0.0349	1.0176"
36"	0.0349	1.2571"
42"	0.0349	1.4667"
48"	0.0349	1.6762"



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III. TESTING

GENERAL INFORMATION

A variety of testing methods exist for the inspection of pipe installations. Every installation will benefit from visual inspections performed as soon as pipe has been laid and before it is put into service. Closed circuit television is a common tool used for visual inspection of pipe installations from inside the pipeline. Where testing is a required component of the installation, it is especially important to ensure that pipelines are properly cleaned and free of debris for accurate test results.

PIPE JOINT TESTING

Drainage applications are generally designed to function under non-pressurized conditions. Watertight joint testing, when required, can be performed with water or air pressure. Pressure testing poses a safety hazard and must be performed according to established standards. Several different methods can be used for pressure testing pipe joints; please contact us for additional information.

DEFLECTION TESTING

Pipe installations that follow proper construction standards, especially with regards to backfill, should not require deflection testing. Deflection testing may be performed up to 30 days after installation if required by engineers and/or contract agreements. A properly sized mandrel will be pulled from manhole to manhole to perform the test. Debris or sediment in the pipe can prevent the mandrel from passing through the pipe which may lead to false indications. It is recommended that any failures be investigated further before conclusions are drawn.

IV. REPAIRS

Recommended repair methods used on existing installations depend on the nature of the pipe system and the extent of the damage to be repaired. Soil tight and watertight solutions are available through your PCP representative.

Your Sales Representative's contact information is:

Name: _____

Phone: _____

Email: _____

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* Stocking Locations: Fontana, CA; Sacramento, CA; Eugene, OR; Casa Grande, AZ; Hubbard, OR; Santa Fe, NM; and Grandview, WA



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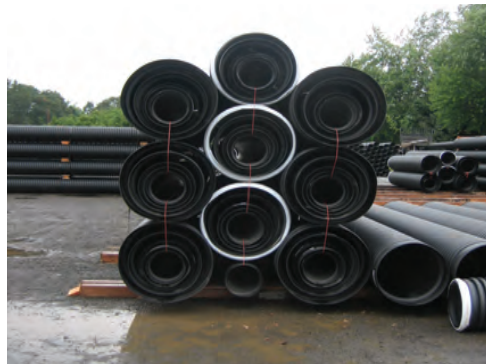
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