For larger branch connection, mechanical tapping saddles specifically designed for use with PE may be used (Figure 6-16). Always inspect the surface of the pipe under the saddle to ensure that it is free of scratches and surface damage that might allow a leak path.

SERVICE CONNECTIONS

Saddle tapping tees have internal cutters and do not require external valving. The service line should be connected before tapping and a pressure test conducted. Prior to installing the connection, the installer must verify the minimum bend radius per Table 8-4 – Minimum cold (field) bending radius.

Saddle Tapping Tees

Saddle tapping tees are typically used for service line connections to provide a means to tap a live main without special tapping equipment. Tapping tees include an internal *punch* or cutter as part of the tapping tee assembly, for perforating the main. Punches for the tapping operation range in size from 0.5 in. to 1.8 in. (currently commercially available) and will produce a very clean hole of the same size as the punch cutter while retaining the "coupon" cut from the pipe wall. Saddle bases are contoured for sidewall fusion or electrofusion to mains 1-¼ in. through 12 in. IPS/DIPS (Figure 6-17, 6-18 and 6-19).

For larger diameter, higher pressure pipes with thick walls, it is necessary to ensure that the punch is long enough to punch through the pipe wall. Outlets of tapping tees are



Courtesy of HDPE Municipal Advisory Board. Figure 6-16 Mechanical tapping saddle

AWWA Manual M55



Courtesy of HDPE Municipal Advisory Board.

Figure 6-17 Saddle tapping tees



Courtesy of HDPE Municipal Advisory Board. **Figure 6-18 Corporation stop saddles**



Courtesy of HDPE Municipal Advisory Board.

Figure 6-19 HDPE Service Line

AWWA Manual M55

commonly available in butt or socket style in CTS dimensions ($\frac{1}{2}$ in. through 1- $\frac{1}{4}$ in.) and IPS dimensions ($\frac{1}{2}$ in. through 2 in.)

Corporation Stop Saddle Tapping Tees

Corporation stop saddles are available in sidewall fusion, electrofusion, and mechanical styles. These saddles are threaded for a corporation stop and allow use of live tapping tools for tapping of the mainline. A tapping tool cutter should be designed for use with PE pipe with few teeth and large chip clearance. Bolt-on style saddles should be designed for the movement of PE pipe. Always inspect the surface of the pipe under the saddle to be free of scratches that might allow a leak path (Figure 6-18). Refer to the PPI *Polyethylene Piping Systems Field Manual for Municipal Water Applications*¹⁷ for a description of the available options for connecting service lines to water mains as well as connections to meter boxes and curb stops.

REFERENCES

- ANSI/AWWA C901, Polyethylene (PE) Pressure Pipe and Tubing, ³/₄ In. (19 mm) Through 3 In. (76 mm), For Water Service. Denver, Colo.: AWWA.
- 2. ANSI/AWWA C906, "AWWA Standard for Polyethylene (PE) Pressure Pipe and Fittings, 4 In. Through 65 In. (100 mm Through 1,650 mm) for Waterworks". Denver, Colo.: AWWA.
- 3. PPI TR-14 Water Flow Characteristics of Thermoplastic Pipe, Plastics Pipe Institute, Irving, TX.
- 4. ASTM F1290, Standard Practice for Electrofusion Joining Polyolefin Pipe and Fittings. West Conshohocken, Pa.: ASTM International.
- 5. ASTM F1056, Standard Specification for Socket Fusion Tools for Use in Socket Fusion Joining Polyethylene Pipe or Tubing and Fittings. West Conshohocken, Pa.: ASTM International.
- 6. ANSI/AWWA C153, ANSI Standard for Ductile-Iron Compact Fittings, 3 in. (76 mm) Through 64 in. (1,600 mm), for Water Service. Denver, Colo.: AWWA.
- 7. ANSI/AWWA C110, ANSI Standard for Ductile-Iron and Gray-Iron Fittings, 3 in. through 48 in. (76 mm through 1,219 mm), for Water. Denver, Colo.: AWWA.
- 8. ASTM D3261, Standard Specification for Butt Heat Fusion Polyethylene (PE) plastic fittings for PE Plastic Pipe and Tubing. West Conshohocken, Pa.: ASTM International.
- 9. ASTM F2206, Standard Specification for Fabricated Fittings of Butt-Fused Polyethylene (PE) Plastic Pipe, Fittings, Sheet Stock, Plate Stock, or Block Stock. West Conshohocken, Pa.: ASTM International.
- 10. ASTM F1055, Standard Specification for Electrofusion Type Polyethylene Fittings for Outside Diameter Controlled Polyethylene and Crosslinked Polyethylene (PEX) Pipe and Tubing. West Conshohocken, Pa.: ASTM International.
- 11. MAB-1, Generic Electrofusion Procedure for Field Joining of 12 Inch and Smaller Polyethylene (PE) Pipe. Irving, Tex.: Plastics Pipe Institute.
- 12. MAB-2, Generic Electrofusion Procedure for Field Joining of 14 Inch to 30 Inch Polyethylene (PE) Pipe. Irving, Tex.: Plastics Pipe Institute.
- 13. ASTM F2620, Standard Practice for Heat Fusion Joining of Polyethylene Pipe and Fittings. West Conshohocken, Pa.: ASTM International.
- 14. ASTM F3190, Standard Practice for Heat Fusion Equipment (HFE) Operator Qualification on Polyethylene (PE) and Polyamide (PA) Pipe and Fittings. West Conshohocken, Pa.: ASTM International.
- 15. PPI TN-38, Bolt Torque For Polyethylene Flanged Joints. Irving, Tex.: Plastics Pipe Institute.

- 16. MAB-4, Basic HDPE Repair Options. Irving, Tex.: Municipal Advisory Board/Plastics Pipe Institute.
- 17. PPI Polyethylene Piping Systems Field Manual for Municipal Water Applications. Irving, Tex.: Plastics Pipe Institute.
- 18. Gas Technology Institute. 2019. GTI Project No. TBD, PE 4710 Mitered Tee Finite Element Analysis. Des Plaines, IL.: Gas Technology Institute.

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AWWA MANUAL

M55



Transportation, Handling, and Storage of Pipe and Fittings

After the piping system has been designed and specified, the piping system components must be obtained. Typically, project management and purchasing personnel work closely together so that the necessary components are available when needed for the upcoming construction work.

RECEIVING INSPECTION

Few things are more frustrating and time consuming than not having what you need, when you need it. Before piping system installation begins, an important initial step is a receiving inspection of incoming products. Construction costs can be minimized and schedules maintained by checking incoming goods to be sure the parts received are the parts that were ordered, and that they arrived in good condition and are ready for installation.

PE4710 pipe, fittings, and fabrications are shipped by commercial carriers who are responsible for the products from the time they leave the manufacturing plant until the receiver accepts them. Pipe and fabricated fittings and structures are usually shipped on flatbed trailers. Smaller fittings may be shipped in enclosed vans or on flatbed trailers depending on size and packaging. Molded fittings are usually boxed and shipped by commercial parcel services.

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PRODUCT PACKAGING

Depending on size, PE piping is produced in coils or in straight lengths. Although PE pipe is lightweight, weight limitations may restrict load size for very heavy wall or longer length pipe. Tie down and load restraint or blocking are required to protect the pipes from excessive deflection and squished loads.

ANSI/AWWA C901 PE pipe is usually produced in coils. Coil lengths will vary with the pipe size. Coils are stacked together into silo packs.

ANSI/AWWA C906 PE pipe is usually produced in 40 ft or 50 ft straight lengths. Other pipe lengths up to 60 ft are possible; however, state transportation restrictions on load length, height, weight, and width will govern allowable truckload configurations. Straight lengths are bundled together in bulk packs or loaded on the trailer in strip loads. Pipe packaged in straight lengths or coils should have end caps to protect foreign debris and water from entering the pipe. Higher freight costs will apply to loads that exceed length, height, or width restrictions. Consult with the pipe manufacturer for pipe length and freight information.

Figures 7-1 through 7-3 are general illustrations of truckload and packaging configurations. Actual truckloads and packaging may vary from the illustrations.

Small fittings are packaged in cartons, which may be shipped individually by package carriers. Large orders may be palletized and shipped in enclosed vans. Large fittings and custom fabrications may be packed in large boxes on pallets or secured to pallets. Very large diameter fabricated fittings (>12 in. in diameter) require special handling during shipping, unloading, and installation. Precautions should be taken to prevent bending moments that could break the fitting during these periods. These fittings are sometimes wrapped with a reinforcement material, such as fiberglass, for protection, which does not increase the pressure rating of the fitting.

CHECKING THE ORDER

When a shipment is received, it should be checked to ensure that the correct products and quantities have been delivered. Several documents are used. The purchase order or the order acknowledgment lists each item by its description and the required quantity. The incoming load will be described in a packing list, which is attached to the load. The descriptions and quantities on the packing list should match those on the purchase order or the order acknowledgment.





AWWA Manual M55

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Figure 7-2 Typical bulk pack truckload



Figure 7-3 Typical strip load truckload

The carrier will present a bill of lading that generally describes the load as the number of packages the carrier received from the manufacturing plant. The order acknowledgment, packing list, and bill of lading should all be in agreement. Any discrepancies must be reconciled among the shipper, the carrier, and the receiver. The receiver should have a procedure for reconciling any such discrepancies.

LOAD INSPECTION

All AWWA PE pipe is marked to identify size, dimension ratio, pressure class, material, date of manufacture, and the manufacturer's production code. When the pipe is received, it should be visually inspected to verify that the correct product was received. The product should also be checked for damage that may have occurred during transit. Look

AWWA Manual M55

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for fractures, kinking, deep gouges, or cuts. Minor scratches or scuffing will not impair serviceability of the PE pipe and fittings. However, PE4710 pipe (up to 65-in. diameter) with gouges or cuts in excess of 10 percent of the product wall should not normally be used. The length of pipe affected by the damaged section may be cut out and the remainder of the product reused. The commercial carrier and manufacturer should be advised immediately of any damage or discrepancies.

When pipe installation involves saddle fusion joining, diesel smoke on the pipe's outside surface may be a concern because it may reduce the quality of saddle fusion joints. Covering at least the first third of the load with tarpaulins effectively prevents smoke damage. If smoke tarps are required, they should be in place covering the load when it arrives.

RECEIVING REPORT AND REPORTING DAMAGE

The delivering truck driver will ask the person receiving the shipment to sign the bill of lading and acknowledge that the load was received in good condition. Any damage, missing packages, etc., should be noted on the bill of lading at that time.

UNLOADING INSTRUCTIONS

Manufacturer's recommended unloading instructions are given to the drivers before they leave the manufacturing plant. Unloading personnel should get these instructions from the driver and review them before unloading the truck.

Before unloading the shipment, there must be adequate, level space to unload the shipment. The truck should be on level ground with the parking brake set and the wheels chocked. Unloading equipment must be capable of safely lifting and moving pipe, fittings, fabrications, or other components.

Note: Unloading and handling must be performed safely. Unsafe handling can result in damage to property or equipment and be hazardous to persons in the area. Keep unnecessary persons away from the area during unloading.

Note: Only properly trained personnel should operate unloading equipment.

UNLOADING SITE REQUIREMENTS

The unloading site must be relatively flat and level. It must be large enough for the carrier's truck, the load handling equipment and its movement, and for temporary load storage. Silo packs and other palletized packages should be unloaded from the side with a forklift. Nonpalletized pipe, fittings, or fabrications should be unloaded from above with lifting equipment and wide web slings, or from the side with a forklift.

HANDLING EQUIPMENT

Appropriate unloading and handling equipment of adequate capacity must be used to unload the truck. Safe handling and operating procedures must be observed. Pipe, fittings, or fabrications must not be pushed or dumped off the truck or dropped.

Although PE piping components are lightweight compared to similar components made of metal, concrete, clay, or other materials, larger components can be heavy. Lifting and handling equipment must have adequate rated capacity to lift and move components from the truck to temporary storage. Equipment such as a forklift, a crane, a side boom tractor, or an extension boom crane is used for unloading.

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Figure 7-4 Forklift load capacity

When using a forklift or forklift attachments on equipment, such as articulated loaders or bucket loaders, lifting capacity must be adequate at the load center on the forks. Forklift equipment is rated for a maximum lifting capacity at a distance from the back of the forks (Figure 7-4). If the weight-center of the load is farther out on the forks, lifting capacity is reduced.

Before lifting or transporting the load, forks should be spread as wide apart as practical, forks should extend completely under the load, and the load should be as far back on the forks as possible.

Note: During transport, a load on forks that are too short or too close together, or a load too far out on the forks, may become unstable and pitch forward or to the side and result in damage to the load or property or hazards to persons.

Lifting equipment, such as cranes, extension boom cranes, and side boom tractors, should be hooked to wide web choker slings that are secured around the load or to lifting lugs on the component. Only wide web slings should be used. Wire rope slings and chains can damage components and should not be used. Spreader bars should be used when lifting pipe or components longer than 20 ft.

Note: Before use, inspect slings and lifting equipment. Equipment with wear or damage that impairs function or load capacity should not be used.

Pipe that is packaged in coils, especially in diameters above 2 in., is difficult to handle without proper equipment. Lifting and handling equipment having sufficient capacity for the weight and size of the coil is required. Further, coiled pipe larger than 2 in. can have ovality exceeding 5 percent. Specialized equipment that straightens and rounds the pipe at the time of installation may be required.

UNLOADING LARGE FABRICATIONS

Large fabrications should be unloaded using a wide web choker sling and lifting equipment such as an extension boom crane, crane, or lifting boom. Do not use stub outs, outlets, or fittings as lifting points, and avoid placing slings where they will bear against outlets or fittings.

PREINSTALLATION STORAGE

The size and complexity of the project and the components will determine preinstallation storage requirements. For some projects, several storage or staging sites along the right-of-way may be appropriate, while a single storage location may be suitable for another job.

AWWA Manual M55

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The site and its layout should provide protection against physical damage to components. General requirements are for the area to be of sufficient size to accommodate piping components, to allow room for handling equipment to get around them, and to have a relatively smooth, level surface free of stones, debris, or other material that could damage pipe or components, or interfere with handling. Pipe may be placed on 4-in. wide wooden dunnage, evenly spaced at intervals of 4 ft or less. PE molded, fabricated, or electrofusion fittings should be stored on pallets or remain in shipping crates as the smaller items are more susceptible to damage during storage.

PIPE STACKING HEIGHTS

Coiled pipe is best stored as received in silo packs. Individual coils may be removed from the top of the silo pack without disturbing the stability of the remaining coils in the silo package.

Pipe received in bulk packs or strip load packs should be stored in the same package. If the storage site is flat and level, bulk packs or strip load packs may be stacked evenly on each other to an overall height of about 6 ft. For less level terrain, stacking height should be limited to about 4 ft.

Before removing individual pipe lengths from bulk packs or strip load packs, the pack must be removed from the storage stack and placed on the ground.

Individual pipes may be stacked in rows. Pipes should be laid straight, not crossing over or entangled with each other. The base row must be blocked to prevent sideways movement or shifting (Figure 7-5 and Table 7-1). The interior of stored pipe should be kept free of debris and other foreign matter. The pipe ends should be capped until ready for fusion.

EXPOSURE TO ULTRAVIOLET LIGHT AND WEATHER

PE pipe products are protected against deterioration from exposure to ultraviolet (UV) light and weathering effects. Color and black products are compounded with antioxidants, thermal stabilizers, and UV stabilizers. Color products use sacrificial UV stabilizers that absorb UV energy and are eventually depleted. Code E material (nonblack products) shall contain sufficient UV stabilizers to protect the pipe against UV degradation for not less than three years; however, some manufacturers may allow longer unprotected outside storage durations. Black products contain at least 2 percent carbon black to protect the material from UV deterioration and are generally suitable for outdoor storage, as discussed



Figure 7-5 Loose pipe storage

AWWA Manual M55

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