

## Model Specification 509 DRISCOPLEX<sup>®</sup> 4200 and DRISCOPLEX<sup>®</sup> 4300 Gravity Flow Sanitary Sewer

*The user may choose to adopt part or all of this Model Specification; however, the user should ensure that all parts used are appropriate for the user's purpose. See notice below.*

### 1 General Terms and Conditions

- 1.1 Scope. This specification covers requirements for DriscoPlex<sup>®</sup> 4200 (IPS) and DriscoPlex<sup>®</sup> 4300 (DIPS) high-density polyethylene for gravity sanitary sewer. All work shall be performed in accordance with these specifications.
- 1.2 Engineered and Approved Plans. Gravity sanitary sewer construction shall be performed in accordance with engineered construction plans for the work prepared under the direction of a Professional Engineer.
- 1.3 Referenced Standards. Where all or part of a Federal, ASTM, ANSI, AWWA, etc., standard specification is incorporated by reference in these Specifications, the reference standard shall be the latest edition and revision.
- 1.4 Licenses and Permits. A licensed and bonded General Contractor shall perform all sanitary sewer force main construction work. The Contractor shall secure all necessary permits before commencing construction.
- 1.5 Inspections. All work shall be inspected by an Authorized Representative of the Owner who shall have the authority to halt construction if, in his opinion, these specifications or standard construction practices are not being followed. Whenever any portion of these specifications is violated, the Project Engineer or his Authorized Representative, shall, by written notice, order further construction to cease until all deficiencies are corrected. A copy of the order shall be filed with the Contractor's license application for future review. If the deficiencies are not corrected, performance shall be required of the Contractor's surety.

**NOTICE.** This publication is for informational purposes and is intended for use as a reference guide. It should not be used in place of the advice of a professional engineer. This publication does not contain or confer any warranty or guarantee of any kind. Performance Pipe has made every reasonable effort towards the accuracy of the information contained in this publication, but it may not provide all necessary information, particularly with respect to special or unusual applications. This publication may be changed from time to time without notice. Contact Performance Pipe to ensure that you have the most current edition.

2 **Polyethylene Pipe and Fittings**

- 2.1 Qualification of Manufacturers. The Manufacturer shall have manufacturing and quality assurance facilities capable of producing and assuring the quality of the pipe and fittings required by these Specifications. The Manufacturer's production facilities shall be open for inspection by the Owner or his Authorized Representative. The Project Engineer shall approve qualified Manufacturers.
- 2.2 Approved Manufacturers. Manufacturers that are qualified and approved by the Project Engineer are listed below. Products from unapproved manufacturers are prohibited.  
Performance Pipe, a division of Chevron Phillips Chemical Company LP
- 2.3 Materials. Materials used for the manufacture of polyethylene pipe and fittings shall be PE 3608 (formerly PE 3408) high density polyethylene meeting cell classification 345464C for black or 345464E for color and stripes per ASTM D 3350; and shall be Listed in the name of the pipe and fitting Manufacturer in PPI (Plastics Pipe Institute) TR-4 with a standard grade HDB rating of 1600 psi at 73°F. The Manufacturer shall certify that the materials used to manufacture pipe and fittings meet these requirements. The fitting material may be gray or black.
- 2.4 Interchangeability of Pipe and Fittings. Polyethylene pipe and fittings shall be supplied by the same qualified and approved manufacturer. Products from non-approved Manufacturers are prohibited. Pipe and fittings from different Manufacturers may be used if both are approved.
- 2.5 Polyethylene Pipe. Polyethylene pipe shall be manufactured in accordance with ASTM F 714 and shall be so marked. Each production lot of material or pipe shall be tested for melt index, density and for black pipe, % carbon. Each production lot of pipe shall be tested for dimensions and ring tensile strength.
- 2.6 Polyethylene Fittings. Molded polyethylene fittings shall be supplied by Performance Pipe. Fabricated fittings shall be supplied by an approved manufacturer. Butt fusion outlets shall be made to the same outside diameter, wall thickness, and tolerances as the mating pipe.
- 2.7 Molded Fittings. Molded polyethylene fittings shall be manufactured and tested in accordance with ASTM D 3261 and shall be so marked.
- 2.7.1 X-Ray Inspection. The Manufacturer shall submit samples from each molded fittings production lot to x-ray inspection.
- 2.8 Fabricated Fittings. Fabricated fittings shall be made by heat fusion joining specially machined shapes cut from pipe, polyethylene sheet stock, or molded fittings. Fabricated fittings shall be rated for internal pressure service at least equal to the full service pressure rating of the mating pipe.
- 2.9 Custom Fabrications & Manholes. Custom fabrications and manholes shall be constructed to shop drawings that have been approved by the Project Engineer. Manholes shall be designed in accordance with ASTM F 1759.

- 2.10 Polyethylene Flange Adapters. Flange adapters shall be made with sufficient through-bore length to be clamped in a butt fusion-joining machine without the use of a stub-end holder. The sealing surface of the flange adapter shall be machined with a series of small v-shaped grooves (serrations) to promote gasketless sealing, or restrain the gasket against blowout.
- 2.11 Back-up Rings & Flange Bolts. Flange adapters shall be fitted with convoluted ductile iron backup rings. The back-up ring bore shall be chamfered or radiused to provide clearance to the flange adapter radius. Flange bolts and nuts shall be Grade 2 or higher.
- 2.12 MJ Adapters. MJ Adapters shall have a stainless steel stiffener that is mechanically locked into the adapter.
- 2.13 Compliance Tests. Manufacturer's inspection and testing of the materials. In case of conflict with Manufacturer's certifications, the Contractor, Project Engineer, or Owner may request retesting by the Manufacturer or have retests performed by an outside testing service. All retesting shall be at the requestor's expense, and shall be performed in accordance with the Specifications.

### 3 Joining

- 3.1 Heat Fusion Joining. Joints between plain end pipes and fittings shall be made by butt fusion using procedures that are in accordance with ASTM F2620. The Contractor shall ensure that persons making heat fusion joints have received training in the recommended procedure. The Contractor shall maintain records of trained personnel, and shall certify that training was received not more than 12 months before commencing construction. External and internal beads shall not be removed.
  - 3.1.1 Butt Fusion of Unlike Wall Thickness. Butt fusion shall be performed between pipe ends, or pipe ends and fitting outlets that have the same outside diameter and are not different in wall thickness by more than one Standard DR, for example, SDR 13.5 to SDR 17, or SDR 11 to SDR 13.5. Transitions between unlike wall thickness greater than one SDR shall be made with a transition nipple (a short length of the heavier wall pipe with one end machined to the lighter wall) or by mechanical means or electrofusion. Standard DR's for polyethylene pipe are 9, 11, 13.5, 17, 21, 26, 32.5 and 41.
  - 3.1.2 Heat Fusion Training Assistance. Upon request and at the requestor's expense, training personnel from the Distributor shall be made available.
- 3.2 Joining by Other Means. Polyethylene pipe and fittings may be joined together or to other materials by means of (a) flanged connections (flange adapters and back-up rings), (b) mechanical couplings designed for joining polyethylene pipe or for joining polyethylene pipe to another material, (c) MJ Adapters or (d) electrofusion. When joining by other means, the installation instructions of the joining device manufacturer shall be observed.
- 3.3 Branch Connections. Branch connections to the main shall be made with saddle fittings or tees. Fusion shall be in accordance with ASTM F2620.
  - 3.3.1 Liner section joints. Joints between liner sections may be made with a full encirclement repair coupling over a full encirclement elastomeric gasket. Repair couplings shall be of stainless steel construction with a bolted seam, and shall be at least two pipe diameters in length.

3.4 Service Connections. A service connection to the installed liner shall be made using a mechanical strap-on saddle, an Inserta-Tee<sup>®1</sup>, or saddle fusion or electrofusion branch saddles. Reconnect service laterals by installing a new section of lateral service pipe to the liner service saddle; then connecting it to the existing service lateral pipe with elastomeric tube connectors secured with stainless steel band clamps.

3.5 Manhole Connections. Connections to non-polyethylene manholes may be made with a mechanical seal such as a Link-Seal®, a chemical seal such as packing with oakum rope saturated with water-activated polyurethane sealant or other means approved by the Project Engineer. The seal shall be finished off in the manhole with low shrink grout.

#### 4 Installation

4.1 General. When delivered, a receiving inspection shall be performed and any shipping damage shall be reported to the Manufacturer within 7 days. Underground installation shall be in accordance with these specifications and ASTM D 2321.

4.2 Foundation and Grade. Pipe shall be laid on a stable foundation that provides continuous support without voids below the pipe. Unstable trench bottom soils shall be removed, and a 6" foundation or bedding of compacted Class I material shall be installed to pipe bottom grade. Excess groundwater shall be removed from the trench before laying the foundation or bedding and the pipe. A trench cut in rock or stony soil shall be excavated to 6" below pipe bottom grade, and brought back to grade with compacted Class I bedding. All ledge rock, boulders and large stones shall be removed. The trench bottom shall be graded to the required slope before placing the pipe in the trench. Where bedding must be removed to provide clearance for Inserta-Tee is a registered trademark of Inserta Fittings Company, devices such as mechanical joints, bolted flanges or appurtenances, the bedding shall be replaced and compacted beneath the device before backfilling so that pipeline grade and continuous support without voids are maintained. All necessary precautions shall be taken to ensure a safe working environment in accordance with all applicable safety codes and standards.

4.3 Excavation. Trench excavations shall conform to the plans and drawings, as authorized in writing by the Project Engineer or his Approved Representative, and in accordance with all applicable codes. Where necessary, trench walls shall be shored or reinforced, and all necessary precautions shall be taken to ensure a safe working environment.

4.4 Large Diameter Fabricated Fittings. The plain-end inlet of 16" IPS and larger fabricated directional fittings (elbows, tees, etc.) shall be butt fused to the end of a pipe length. The remaining fitting outlet connections shall be made in the trench using butt fusion, flange or other connection means in accordance with 3.2. Flange and other mechanical connections shall be assembled, and tightened in accordance with the connection manufacturer's instructions and

4.5. Connecting pipe lengths to more than one outlet of a 16" IPS or larger fabricated fitting before placing the pipe in the trench is prohibited. The installing contractor at his expense shall correct fitting damage caused by such improper handling.

- 4.5 Mechanical Joint & Flange Installation. Mechanical joint and flange connections shall be installed in accordance with the Manufacturer's recommended procedure. MJ Adapters and flanges shall be centered and aligned to each other before assembling and tightening bolts. In no case shall MJ gland or flange bolts be used to draw the connection into alignment. Bolt threads shall be lubricated, and flat washers should be used under the nuts. Bolts shall be evenly tightened according to the tightening pattern and torque step recommendations of the Manufacturer. At least 1 hour after initial assembly, flange connections shall be re-tightened following the tightening pattern and torque step recommendations of the Manufacturer. The final tightening torque shall be as recommended by the Manufacturer.
- 4.6 Pipe Handling. When lifting with slings, only wide fabric choker slings capable of safely carrying the load shall be used to lift, move, or lower pipe and fittings. Wire rope and chain are prohibited. Slings shall be of sufficient capacity for the load, and shall be inspected before use. Worn or damaged equipment shall not be used.
- 4.7 Backfilling. Embedment material soil type and particle size shall be in accordance with ASTM D 2321. Embedment shall be placed and compacted to at least 90% Standard Proctor Density in 6" lifts to at least 6" above the pipe crown. During embedment placement and compaction, care shall be taken to ensure that the haunch areas below the pipe springline are completely filled and free of voids.
- 4.8 Final Backfilling. Final backfill shall be placed and compacted to finished grade. Native soils may be used provided the soil is free of debris, stones, boulders, clumps, frozen clods or the like larger than 8" in their largest dimension.
- 5 Testing.
- 5.1 Fusion Quality. The Contractor shall ensure the field set-up and operation of the fusion equipment, and the fusion procedure used by the Contractor's fusion operator while on site. Upon request by the Owner, the Contractor shall verify field fusion quality by making and testing a trial fusion. The trial fusion shall be allowed to cool completely; then test straps shall be cut out and bent strap tested in accordance with ASTM F2620. If the bent strap test of the trial fusion fails at the joint, the field fusions represented by the trial fusion shall be rejected. The Contractor at his expense shall make all necessary corrections to equipment, set-up, operation and fusion procedure, and shall re-make the rejected fusions. Testing of large diameter fusion ( $\geq 12"$ ) may require special equipment and safety precautions.
- 5.2 Leak Testing. Leak testing shall be conducted in accordance with ASTM F1417.