



# Model Specification PP 688

## DRISCOPEX® 6300 Series Piping

### For Non-Federally Regulated Biogas Application

*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® PE4710 high-density polyethylene (HDPE) pipe and fittings for non-federally regulated biogas systems. For federally regulated (subject to jurisdiction of 49 C.F.R. 192) piping applications – See Model Specification PP 687: *DriscoPlex® 6400 Series Piping for Federally Regulated Biogas Application*. All work shall be performed in accordance with these specifications.
- 1.2 Engineered and Approved Plans. Biogas piping construction shall be performed in accordance with engineered construction plans for the work prepared under the direction of a Professional Engineer. Plans shall conform to the standards and regulations for non-federally regulated biogas applications. Pipe, fittings, and the installation shall meet the requirements of ASTM F2619 and API 15LE
- 1.3 Referenced Standards. Where all or part of a Federal, ASTM, API, NFPA, 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 Contractor shall perform all biogas piping 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 their opinion, these specifications or standard construction practices are not being followed. Whenever any portion of these specifications is violated, the Project Engineer or their 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.

Note: This publication is intended for use as a guide to support the designer of the piping system and, while Performance Pipe has made every reasonable effort to ensure the accuracy of this information, recipient is encouraged to independently verify all information and agrees that such information is not to be used in place of the advice of a professional engineer. Performance Pipe offers the information contained herein without any express or implied warranty or guarantee of any kind and all such information is accepted and used at recipient's sole risk. This publication is subject to change without notice – please 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 control facilities that are 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 Customer or their Authorized Representative. The pipe and fitting manufacturer shall be ISO certified in accordance with ISO 9001:2015 and have a documented quality management system that defines product specifications and manufacturing and quality assurance procedures that assure conformance with customer and applicable regulatory requirements. Upon request, the manufacturer shall provide a current Certificate of Compliance from an independent ISO 9000 Registrar.
- 2.2 Approved Manufacturers. Manufacturers shall be PPI (Plastics Pipe Institute) members with depended listings in PPI TR-4. Manufacturers that are qualified and approved by the project engineer are listed below. Any other manufacturer must be approved by the project engineer in writing, prior to the bid date. Products from unapproved manufacturers are prohibited.

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- 2.3 Materials. HDPE materials used for the manufacture of polyethylene pipe and fittings shall be PE4710 meeting the cell classification of 445574C per ASTM D3350; and shall be listed in PPI TR-4 with standard grade HDB ratings of 1600 psi at 73°F and 1000 psi at 140°F.
- 2.4 Polyethylene Pipe. Pipe shall be manufactured and tested in accordance with ASTM F2619 and API 15LE.
- 2.5 Pipe Marking Requirements. Pipe shall be marked in accordance with ASTM F2619 and API 15LE. Pipe shall include the word "Biogas" in the markings
- 2.6 Polyethylene Molded Fittings. Polyethylene molded fittings shall be manufactured, tested and marked in accordance with ASTM D3261. Pipe and molded fittings shall be provided by the same manufacturer.
- 2.7 Polyethylene Fabricated Fittings. Polyethylene fabricated fittings shall be manufactured, tested and marked in accordance with ASTM F2206. Fabricated fittings shall be manufactured with feedstock provided by the pipe manufacturer. Fabricated fittings shall be rated for internal pressure service at least equal to the full service pressure rating of the mating pipe
- 2.8 Manufacturer's Material Quality Control. The pipe and fitting manufacturer shall have an established quality control program responsible for inspecting incoming and outgoing materials in accordance with the applicable standards (e.g. ASTM F2619 and API 15LE for pipe).
- 2.8.1 The Manufacturer shall subject samples from each molded fitting production lot to x-ray inspection and knit line strength testing.



2.8.2 **Quality Control Records.** The manufacturer maintains records of tests conducted in accordance with specification requirements for a minimum of five years. Manufacturer should be prepared to provide upon request, a Certification of Conformance letter and appropriate quality assurance test data required by the standards.

2.9 **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 these Specifications.

### 3 **Joining**

3.1 **Heat Fusion Joining.** Joints between plain end pipes and fittings should be made by butt fusion. Joints between the main and saddle branch fittings should be made using saddle fusion. The butt fusion and saddle fusion procedures used shall be per ASTM F2620 or procedures that are recommended by the pipe and fitting Manufacturer. Heat fusion equipment operators shall be qualified per the standard practice ASTM F3190. The operator shall ensure that all persons making heat fusion joints have been qualified to make joints in accordance with the operator's approved qualified fusion procedures. The operator shall maintain records of qualified personnel and shall certify that qualification training was received not more than 12 months before commencing construction.

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 9 to SDR 11 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 DRs for polyethylene pipe are 7.3, 9, 11, 13.5, 17 and 21.

3.1.2 **Heat Fusion Training Assistance.** Upon request and at the requestor's expense, training personnel from the Manufacturer or their Representative shall be made available.

3.2 **Joining by Other Means.** Polyethylene biogas pipe and fittings may be joined together or to other materials by transition fittings, mechanical couplings or electrofusion. Mechanical fittings shall be designed to restrain and to prevent pull-out or rotation of the pipe (i.e. fully restrained). These devices shall be designed for joining polyethylene and to the other material; and shall be approved by the operator for use in their biogas system. When joining by other means, the installation instructions of the joining device manufacturer shall be observed.



- 3.2.1 When mechanical OD compression couplings are used, polyethylene biogas pipe shall be reinforced with a stiffener in the pipe bore. Stiffeners shall be properly sized for the diameter and wall thickness of polyethylene pipe being joined. For service pipe connections, the stiffener length shall match the pipe end penetration depth into the coupling.

## 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. Installation shall be in accordance with ASTM D2774, Manufacturer's recommendations and this specification. All necessary precautions shall be taken to ensure a safe working environment in accordance with all applicable safety codes and standards.
- 4.2 Excavation. Trench excavations shall conform to the plans and drawings, as authorized in writing by the Project Engineer or their Approved Representative and in accordance with all applicable codes. The Contractor shall remove excess groundwater. Where necessary, trench walls shall be shored or reinforced, and all necessary precautions shall be taken to ensure a safe working environment.
- 4.3 Large Diameter Fabricated Fittings. Not more than one plain-end connection of 16" IPS and larger fabricated directional fittings (elbows, tees, etc.) shall be butt fused to the end of a pipe length before placing the assembly into the trench. The remaining fitting connections shall be made in the trench using butt fusion, flange or other connection means in accordance with 3.2. Handling, lifting, moving or lowering a 16" IPS or larger fabricated fitting that is connected to more than one pipe length is prohibited. The installing contractor at their expense shall correct fitting damage caused by such improper handling.
- 4.4 Foundation & Bedding. Pipe shall be laid on grade and on a stable foundation. 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 for 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.
- 4.5 Pipe Handling. Pipe shall be handled in a safe manner that avoids damage to the product. 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.
- 4.6 Backfilling. Embedment material soil type and particle size shall be in accordance with ASTM D 2774. 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.



- 4.7 Protection against shear and bending loads. In accordance with ASTM D 2774, connections shall be protected where an underground polyethylene branch or service pipe is joined to a branch fitting such as a service saddle, branch saddle or tapping tee on a main pipe, and where pipes enter or exit casings or walls. The area surrounding the connection shall be embedded in properly placed, compacted backfill, preferably in combination with a protective sleeve or other mechanical structural support to protect the polyethylene pipe against shear and bending loads.
- 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 3" in their largest dimension.

## 5 Testing

- 5.1 Fusion Quality Testing. The Contractor shall ensure proper field set-up and operation of the fusion equipment; and ensure appropriate fusion procedures are followed 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 before the testing. For pipe wall thickness 1" and less, bent test straps shall be cut out and tested in accordance with ASTM F2620. Larger/thicker pipe fusions may be tested per ASTM F3183 (guided side bend test) If the test of the trial fusion fails at the joint, the field fusions represented by the trial fusion shall be rejected. The Contractor, at their expense, shall make all necessary corrections to equipment, set-up, operation, and fusion procedure, and shall re-make the rejected fusions. Additionally, there are several quality controls for verifying fusion joint quality:
- i. Operator training in identifying a properly made fusion
  - ii. Recorded fusion information must meet the standard requirements of ASTM F3124
  - iii. Field tensile testing of the joint
  - iv. Leak testing
- 5.2 Leak Testing. Hydrostatic leak testing per ASTM F2164 is preferred due to the hazards associated with testing with a compressible fluid. If the piping system is so designed that it cannot be filled with a liquid, or the piping system service cannot tolerate traces of liquid testing fluid, pneumatic leak testing shall be conducted in accordance with ASTM F2786. The contractor shall take all precautions to eliminate hazards to persons near lines being tested. Pipes being tested shall be supervised at all times.