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DriscoPlex® MDPE and HDPE Pipe For Gas Distribution

MODEL SPECIFICATION

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.

1. General Terms and Conditions

- 1.1 **Scope.** This specification covers requirements for DriscoPlex® PE 2708 and PE 4710 medium density polyethylene (MDPE) and high-density polyethylene (HDPE) pipe and fittings for underground gas distribution systems. All work shall be performed in accordance with these specifications.
- 1.2 **Engineered and Approved Plans.** Underground gas distribution 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 gas distribution piping. Pipe, fittings and the installation shall meet the applicable requirements of the U. S. Department of Transportation, Pipeline Safety Regulations, Title 49, Code of Federal Regulations, and Part 192. Private systems shall meet relevant requirements of NFPA 54/ANSI Z223.1, NFPA 58 or ASME B31.8.
- 1.3 **Referenced Standards.** Where all or part of a Federal, ASTM, ANSI, NFPA, etc., standard specification is incorporated by reference in this document, the reference standard shall be the latest edition and revision unless otherwise noted.
- 1.4 **Licenses and Permits.** A licensed and bonded contractor shall perform all underground gas distribution 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 or operator 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.

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 his authorized representative. The pipe and fitting manufacturer shall be ISO certified in accordance with the current edition of ISO 9001 and 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 form and independent ISO 9000 Registrar.
- 2.2 **Approved Manufacturers.** Manufacturers that are qualified and approved by the project engineer are listed below. Products from unapproved manufacturers are prohibited.

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- 2.3 **Material.** The pipe and fitting manufacture shall use virgin resin, 0% regrind, in the production of MDPE and HDPE pipe and fittings.
- 2.3.1 MDPE materials used for the manufacture of polyethylene pipe and fittings shall be PE 2708 MDPE meeting cell classification 234373E per ASTM D 3350; and shall be listed in PPI (Plastics Pipe Institute) TR-4 with standard grade HDB ratings of 1250 psi at 73°F and 800 psi at 140°F. All MDPE pipe and fittings materials shall be yellow in color.
- 2.3.2 HDPE materials used for the manufacture of polyethylene pipe and fittings shall be PE 4710/PE 100 meeting the cell classification of 445574C and 445576C per ASTM D3350; and shall be listed in PPI (Plastics Pipe Institute) TR-4 with standard grade HDB ratings of 1600 psi at 73°F and 1000 psi at 140°F. The material shall also be listed in the same PPI document as a PE 100 with a MRS (Minimum Required Strength) of 10 Mpa (1450 psi) at 20°C (68°F).
- 2.3.3 Materials with an ASTM D3350 material designation code of “E” shall be stabilized against ultraviolet deterioration and shall be suitable for unprotected outdoor storage for at least three (3) years.
- 2.3.3 Materials with an ASTM D3350 material designation code of “C” shall contain 2% to 3% of finely dispersed carbon black which provides a minimum of 10 years outdoor weather ability.
- 2.4 **Polyethylene Pipe.** Pipe shall be manufactured and tested in accordance with ASTM D 2513 incorporated by reference in 49 CFR Part 192.
- 2.4.1 Pipe should be marked with a 1-Dimension bar code and a 16-Digit alpha numeric code that identifies the manufacturer, production run number, date of manufacture, pipe type and material grade per ASTM F 2897.
- 2.5 **Polyethylene Fittings.** Polyethylene fittings shall be manufactured and tested in accordance with ASTM D 2513 incorporated by reference in 49 CFR Part 192.
- 2.5.1 Fittings should be marked with a 2-Dimension DataMatrix code that identifies the manufacturer, production run number, date of manufacture, fitting type and material grade per ASTM F 2897.
- 2.6 **Manufacturer's Material Quality Control.** The pipe and fitting manufacturer shall have an established quality control program responsible for inspecting incoming and outgoing materials.
- 2.6.1 Incoming polyethylene materials shall be inspected for density, melt flow rate and contamination. The supplier shall certify the cell classification properties of incoming material. Incoming materials shall be approved by quality control before processing into finished goods.
- 2.6.2 Outgoing materials shall be checked for diameter, wall thickness, roundness, concentricity, toe-in, inside and outside surface finish, markings and end cut. Quality control shall verify production checks and test for density, melt flow rate, hoop tensile strength and ductility. X-ray inspection procedures shall be used to inspect molded fittings for voids and knit line strength shall be tested. All fabricated fittings shall be inspected for joint quality and alignment. Representative tests to verify long-term performance shall include pipe inside surface ductility, ambient and elevated temperature sustained pressure testing.
- 2.6.3 Permanent Records. The manufacturer shall maintain records of manufacturing location, pipe production and resin lots for at least 50 years.

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- 2.7 **Manufacturer's Process Quality Control.** The pipe and fitting manufacturer shall have machines, tools and engineering systems in place for process control.
- 2.7.1 Manufacturers shall have extrusion lines equipped with automatic process control capabilities which include 100% pipe wall and outside diameter monitoring.
- 2.8 **Compliance Tests.** The manufacturer shall certify the inspection and testing of the materials and products. In case of conflict with manufacturer's certifications, the contractor, project engineer or operator 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.** Butt, socket and saddle fusion joints in polyethylene gas piping shall be made using procedures that have been qualified and approved by the operator in accordance with Title 49, CFR and Part 192.283.
- 3.1.1 In accordance with CFR. 49, part 192, Section 192.285, 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. The contractor shall ensure that all persons making heat fusion joints are qualified in accordance with this section.
- 3.1.2 The manufacturer shall offer qualified fusion procedures and training materials for the use of the operator.
- 3.1.3 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 (9.3, 9.33) to SDR 11 (11.5) or SDR 11 (11.5) 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 7.3, 9, 11, 13.5, 17 and 21.
- 3.2 **Joining by Other Means.** Polyethylene gas pipe and fittings may be joined together or to other materials by transition fittings, fully restrained mechanical couplings or electrofusion. These devices shall be designed for joining polyethylene to another material and shall be approved by the operator for use in his gas distribution 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 gas 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.** Polyethylene gas distribution piping shall be installed in accordance with CFR 49, Part 192, Subpart G (mains), Subpart H (service lines), applicable codes and regulations and ASTM D 2774.



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- 4.1.1 When delivered, a receiving inspection shall be performed and any shipping damage shall be reported to the manufacturer within 7 days.
- 4.2 **Burial Depth.** All polyethylene gas distribution piping shall be installed in accordance with applicable federal, state and local codes and shall have at least 12" of cover in private property and at least 18" of cover in streets and roads.
- 4.3 **Excavation.** Trench excavations shall conform to the plans and drawings, as otherwise authorized in writing by the project engineer or his 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.
- 4.4 **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. 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 or chain shall not be used. 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 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 D 2657. 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.



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- 5.2 **Leak Testing.** Polyethylene gas distribution systems that are subject to D.O.T. Pipeline Safety Regulations shall be tested in accordance CFR 49, Part 192, Sections 192.509, 192.511 or 192.513 as applicable.
- 5.2.1 The contractor shall take all precautions to eliminate hazards to persons near lines being tested. Pipes being tested shall be supervised at all times.