

Section 02685

NATURAL GAS DISTRIBUTION SYSTEM

PART I GENERAL

1.01 SUMMARY

This section covers the supplying all labor, equipment, materials and appliances and performing all other procedures necessary for the construction of improvements on the City of Tomball natural gas distribution system in accordance with the plans and these specifications. The distribution system includes the distribution mains, valves, pipeline markers, service valves, service regulators, and meters.

1.02 RELATED SECTIONS

Section 02260 Trench Safety System
Section 02317 Excavation and Backfill for Utilities
Section 02605 Conductive Tracer Wire for Nonmetallic Pipe Installations
Section 02684 Constructor Qualification Requirements

1.03 MEASUREMENT AND PAYMENT

Unless otherwise indicated on the Bid Form, the measurement and payment for the work specified in this Section shall be as follows:

- A. Polyethylene Gas Mains. Polyethylene gas line installation including fittings and conductive trace wire shall be measured to the nearest foot and paid for at the unit price per foot of various sizes of pipe installed. Payment for boring of street, highway and railroad crossings shall be measured to the nearest foot and included in the contract price per foot of bore for the various sizes of boring required. The bid price for boring shall be the additional cost for boring over and above the gas line unit price.
- B. Valves. Valves shall be measured and paid for per each. The unit price for each valve shall include the valve, valve box, couplings and all additional fittings required to complete the valve installation according to these plans and specifications.
- C. Service Lines. Measurement and payment for the installation of service lines including all fittings, except for main line tap and valve tee and the anodeless riser shall be by the linear foot of various sizes of service line. Payment for service connections shall be per each for various sizes installed and shall include main line tap and valve tee, anodeless riser, and tie in to meter, if existing. Tie ins to existing meter shall include relighting customer pilot lights. A successful shut-in test shall be performed prior to a customer's gas service being turned on and pilots being relighted. New regulator and meter installations with related stops and

fittings to complete the service installation shall be by others.

- D. Pipeline Markers. The installation of the pipeline markers shall include the sign and post and payment shall be at the unit price bid per each marker installed.

1.04 REFERENCES

The applicable provisions of the following standards shall apply as if written here in their entirety:

ANSI	American National Standards Institute
ASTM	American Society of Testing and Materials
US DOT	United States Department of Transportation
RRC	Railroad Commission of Texas

1.05 SUBMITTALS

- A. Pipe. Certification that the pipe passes the sustained 1,000-hour test as outlined in ASTM D25 13 is required from the pipe producer. The production tests report that must to be furnished to the City of Tomball, Director of Public Works (DPW) or the designated representative of the DPW shall include:
 - 1. Date of Test
 - 2. Maximum and minimum O.D. and minimum wall thickness
 - 3. Lot number
 - 4. Quick burst value
 - 5. Sustained pressure test certification
- B. Pipe Joiners. Provide certificate of qualification issued by an acceptable organization for each person joining plastic pipe. Certificates shall be submitted with the Constructor Personnel Qualification Program information that is required to be submitted with the Bid as described in specification Section 02684 —CONSTRUCTOR QUALIFICATION REQUIREMENTS.

1.06 QUALITY ASSURANCE

Only persons qualified under 49 CFR 192.285 shall be allowed to join plastic pipe and documentation of qualifications shall be included in the Constructor Personnel Qualifications Program as specified in specification Section 02684 — CONSTRUCTOR QUALIFICATION REQUIREMENTS. Persons installing or repairing the natural gas distribution system shall undergo drug testing in accordance with DOT and RRC requirements.

1.07 DELIVERY, STORAGE, AND HANDLING

- A. Polyethylene Pipe. In shipping, delivering, and installing, pipe and accessories shall be handled in such a manner as to insure a sound undamaged condition. Care shall be exercised

in order to avoid rough handling. The pipe and accessories shall not be dropped or have any objects dropped upon it, nor shall it be pushed or pulled over sharp projections. Caution shall be taken to prevent kinking and buckling. Any damage, including kinks and buckles that occur shall be removed by cutting out as a cylinder and replacing at the cost of the Contractor.

- B. Regulators and meters. All regulators and meters must be shipped with dust caps or seals to prevent the entry of dust or moisture under normal shipping and handling conditions.

PART 2 PRODUCTS

2.01 MANUFACTURERS

- A. Polyethylene Pipe. All polyethylene pipe used in the Project must comply with ASTM D-25 13 and be manufactured in the United States.
- B. Polyethylene Valves and Valve Boxes. All valves on the polyethylene pipe shall be a full port polyethylene valve compatible with the piping material, and be manufactured in the United States. Approved valve and valve box manufacturers are as follows:
 - 1. KEROTEST Poly-gas Valves
 - 2. Rockwell POLY VALVE Ball Valves
 - 3. Lyall Poly Ball Valve
 - 4. Handley Valve Box
 - 5. Continental Industries Roadway Valve Box

2.02 MATERIALS AND/OR EQUIPMENT

- A. Polyethylene pipe. The polyethylene pipe for the natural gas distribution lines shall meet the following requirements:
 - 1. Pipe and Fitting Material. All pipe shall conform to the requirements of the currently approved ASTM D-25 13 specification "Thermoplastic Gas Pressure Pipe, Tubing and Fittings." All fittings shall conform to the requirements of ASTM D-2683 specification "Socket-Type Polyethylene Fittings for Outside Diameter-Controlled Polyethylene Pipe" or ASTM D3261 "Butt Heat Fusion Polyethylene (PE) Plastic Fittings for Polyethylene (PE) Plastic Pipe and Tubing." All pipe shall be manufactured of virgin material, with the exception of the clean rework material that is generated from the manufacturer's own production, as long as the pipe and/or fittings meet the required specifications. All pipe formulation must have suitable outdoor weather resistance. The color of all polyethylene pipes shall be either orange or yellow.
 - 2. Pipe Design. All pipe shall be designed for direct burial as specified in D.O.T. Title 49, Part 192, "Transportation of Natural and Other Gas By Pipeline: Minimum Federal Safety

Standards,” through current Amendment, for natural gas mains and services operated at 60 p.s.i.g. Or less. The pipe must also be suitable for replacing old steel mains and services. The pipe must be homogeneous and be free of holes, cracks, foreign material, blisters or other deleterious faults. The minimum design stress must comply with the requirements of ASTM D-25 13.

3. Pipe Size. The pipe shall be designed and pressure rated to conform to the requirements in ASTM D-25 13. The minimum wall thickness for distribution pressures shall be as follows:

Size	O.D.	SDR.	Minimum Wall Thickness
1/2”	0.840	9.3	0.090
3/4”	1.050	11.0	0.095
1”	1.315	11.0	0.119
1-1/4”	1.660	11.0	0.151
1-1/2”	1.900	11.0	0.173
2”	2.375	11.0	0.216
3”	3.500	11.5	0.307
4”	4.500	11.5	0.395
6”	6.625	11.5	0.581

4. Any defect such as a groove, notch, or gouge, greater than ten percent (10%) of the wall thickness of the pipe, shall not be used.

B. Valves. Gas distribution system valves shall be in compliance with the following specifications:

1. Service-Line Valves (Meter Stops). Service-line valves (meter stops) installed above ground shall be a “tamper-proof” iron body, brass (or bronze) core, lock wing stop that complies with the requirements of Code of Regulations D.O.T. Title 49, 192.363. The minimum working pressure shall be 125 p.s.i.g.
2. Polyethylene Valves. The polyethylene valve stub ends must be fabricated from material that is compatible with the pipe used, including the Standard Dimension Ratios (SDR).

C. Service Taps. Service Taps shall be made by a self-tapping tee that also acts as a positive shut off at the main. The base of the tapping tee shall be designed for heat fusion to polyethylene pipe and a socket end branch connection for heat fusion to the service line pipe. The heat fusion base and socket must be manufactured from the same material as the pipe.

D. Service Riser. Service riser to be 1” IPS epoxy coated Schedule 40 steel with 1” IPS polyethylene transition. Riser to be 24” vertical by 36” horizontal.

E. Valve Boxes. Valve boxes shall provide access for operation and maintenance for all valves. The boxes shall be provided with a drop in lid and the word “GAS” clearly visible. Box shall be self-adjusting, have a 6” shaft with an arch base and be suitable for use in areas with vehicular traffic.

F. Service Regulators.

1. Regulators shall comply with the current American National Standards Institute (ANSI) Service-type regulator Specification X-50865 and the requirements of Paragraph 192.197(a) and (b), D.O.T. Title 49, Code of Federal Regulations. Regulators shall be shipped with dust caps or seals to prevent dust or moisture from entering in under shipping and handling conditions.
2. Physical Characteristics.

Body Size:	1-inch
Orifice Size:	1/8-inch
Maximum Inlet Pressure:	125 p.s.i.g.
Set Point:	7-inches water column (w.c.)
Capacity:	360 cu.ft./hr. (min.) @ 10 p.s.i.g. inlet
Internal Relief Valve:	1-inch vent
Finish:	Gray enamel (ASA #49) or equal
Assembly Position:	Reliance, C-2
Assembly Position:	Rockwell, #105
Assembly Position:	Sprague, #3

G. Service Meters.

1. All meters shall comply with the American Gas Association (A.G.A.) Specification OP-58-2. Meters must be shipped or sealed to keep moisture or dust from entering under shipping and handling conditions. The meters shall have the following physical characteristics:

Body & Cover(s): Aluminum

Index: Standard 1/2', 2' & four circles

Index Cover: Clear, high impact strength molded Lexan or other approved plastic

Diaphragms: Synthetic

Identification Plate: Non-corrosive metallic material Year of manufacture must be shown

Performance: Meters shall meet all requirements for Class 275 meters

Proof: Meter proofs at capacity and check rates of flow shall be zero percent (0%) error with a tolerance of plus or minus one half percent (1/2%), but in no case shall the proof at the capacity rate be slower than the check rate. Factory meter proof data sheets shall be supplied for all meters.

Swivels: 1-inch black steel male connections

Swivel Washers: 1/8" thick Neoprene or other material suitable for use with natural gas

Swivel Nuts (Caps) Black Steel Finish: Gray enamel (ASA #49) or equal

2. Large capacity meters shall comply with current A.G.A./ANSI Specifications. The large capacity meters shall have the following physical characteristics:

Body & Cover(s): Aluminum

Index: Vertical circular reading

Index Cover: Clear, high impact strength molded Lexan, or other approved plastic

Diaphragms: Synthetic

Identification Plate: Non-corrosive metallic material Year of manufacturer must be shown

Capacity: See Plans

Connections: See Plans

Finish: Gray enamel (ASA #49) or equal

- H. Pipeline Markers. Signs and posts must be used to mark the gas pipeline at each crossing of a public road or highway, at tracer wire test boxes or wherever it is necessary to identify the location of the pipeline to reduce the possibility of damage or interference. All markers must meet the D.O.T. requirements.
1. Signs. Six (6) foot long composite pipeline markers, Carsonite CUM-375, Sentry Posts, or preapproved equal shall be used. Each sign must have the following printed legibly on a background of sharply contrasting color:
 - a. The word "WARNING" followed by the words "Gas Pipeline" with a letter height of at least one (1) inch and a one-quarter (1/4) inch wide stroke.
 - b. The name "OWNER" followed by _____ telephone number _____.
The Contractor shall verify the telephone number before manufacturing signs.

PART 3 EXECUTION

3.01 ERECTION / INSTALLATION / APPLICATION AND/OR CONSTRUCTION

- A. Polyethylene Pipe.
1. Heat Fusion Joints. Heat fusion, in accordance with D.O.T. Title 49, Code of Federal Regulations and with the proper tools designed for this purpose, or butt fusion with socket fittings shall be used to join the pipe. Threaded fittings and joints shall not be permitted. The same materials as the pipe shall be used to manufacture the main body and fusion surfaces of the pipe fittings. Heat fusion tools shall be maintained in a good working, clean condition. All heating irons used will be checked for the correct temperature each day before production continues. After each jointing procedure is completed, the heater faces must be cleaned in order to remove any accumulated material. All pipe ends must be chamfered in accordance with the manufacturer's recommendations before joining the pipe to socket type fittings. Pipe ends shall be planed perfectly flat for butt fusion joints. Align component parts so that no strain is placed on the joint when they are finally positioned. Couplings and fittings shall be set true.
 2. Mechanical Joints. Compression type mechanical joints to connect polyethylene pipe to steel pipe shall be designed for natural gas use and the gasket material in the coupling

must be compatible with the polyethylene pipe. The coupling must be used in combination with an internal tubular rigid stiffener. When installed, the tubular rigid stiffener must be flush with the end of the pipe and project at least 1/2 inch beyond the outside end of the compression fitting. The stiffener must be free of rough or sharp edges and must not be a force fit in the pipe. Use of a split tubular stiffener shall not be allowed. Joints shall be designed and installed to effectively sustain the longitudinal pull-out forces caused by contraction of the piping or by external loading. Compression couplings shall not be used in above ground installations.

3. Pipe Placement and Backfill.

- a. When installing polyethylene pipe, sufficient slack shall be provided to allow for possible contraction. The polyethylene pipe shall not have a bend that is less than 25 times the outside diameter of the pipe. If a bend is required that is less than 25 times the outside diameter of the pipe, then an approved polyethylene elbow fitting is required. A fusion joint shall not be placed at a bend. During extremely high temperature conditions it may be necessary to cool the pipe before the last connection.
- b. No polyethylene gas line shall be installed above ground. During maintenance, repair, and tie-in work, temporary polyethylene gas lines may be used above ground.
- c. The minimum clearance required between the distribution piping and other underground structures is twelve (12) inches. Trench width and minimum cover shall comply with Section 02222, Excavation, Trenching and Backfilling for Utilities. Unless otherwise shown on plans, pipe embedment shall be select material and remainder of trench may be backfilled with spoil from trenching operation.

4. Pipe Installed in Casing. Each end of the casing shall be sealed to prevent soil and water from migrating into the casing, when the carrier pipe is installed in casing. All casing shall meet the requirements in 192.323 D.O.T., Title 49, Code of Federal Regulations, as well as those imposed by permit, easement and other appropriate controlling factors.

5. Service Lines. Service lines to be 1-inch diameter unless otherwise shown on plans. All materials and equipment shall be installed with the approved recommendations of the manufacturer to comply with the contract documents and the requirements of Paragraph 192.361, D.O.T., Title 49, Code of Federal Regulations. Workmen skilled in this installation must perform the work. All joints on the service line must conform to the requirements of Paragraphs 192.281, 192.283, & 192.285, D.O.T., Title 49, Code of Federal Regulations.

- a. Service Lines Connected to a Polyethylene Main. All hot taps shall be made by qualified fusers using self-tapping tees. A sidewall fusion jig must be used for tapping tees. When the outlet fusion joint is finished, it must be covered by a protective sleeve.

- b. Service Lines Connected to a Steel Main. An approved self tapping welded tee shall be used for making service taps on steel mains. All welding shall be done by welder certified under API-1104 standards.
 - c. Service Riser. The service riser must be protected from vehicular traffic. Support for the riser must prevent the transferal of forces to the service pipe as a result of accidental movement of the riser or natural settling.
6. Conductive Tracer Wire. Install conductive tracer wire with all polyethylene gas lines.
7. Swabbing and Pigging. Prior to joining, all individual gas main lengths shall be swabbed. All gas mains shall be pigged prior to initiation of gas service, but after joining has been complete. The pigs used shall be suitable for different size pipes and be designed for polyethylene pipe use. Any pig that could damage the pipe, such as wire brush type pigs, shall not be acceptable for use. Only use of compressed air to drive the pig through the pipe shall be permitted.
- B. Valves and Valve Boxes: Install valves and valve boxes plumb. All boxes shall be installed flush with the finished grade. Support box with brick or other approved material. Adequate backfill shall be placed around the valve boxes and valve extension boxes to prevent any damage or settlement to the pipeline that may be transferred to the pipe through the valve box. Protective sleeves shall be installed over fusion joints and extend through the valve boxes on the polyethylene valve installations.
- C. Signs and Posts: After the pipeline installation has been completed, the Contractor shall install signs and posts at the locations designated by the DPW or the designated representative of the DPW. Bury the anchor end of all posts approximately two (2) feet deep.
- D. Shut Down of Work: When work has shut down for each day, all lines shall be capped, sealed, and pressured to 20 pounds with air. When a Project is not immediately tied-in, plug and seal all openings in the pipe. If a pipeline is to be abandoned in place, then disconnect the gas supply source, purge all of the gas from the abandoned system, and seal all of the ends.
- E. Purging Pipes and Fittings: A combustible gas indicator shall be used when purging mains and piping. When purging gas from abandoned lines, the air and the gas must be discharged aboveground and directed away from power lines or structures. When purging air from new lines, installation of a 3/4 service saddle and non-corrodible riser is required four (4) feet from each deadend on all new installations of pipe in order to purge air from all deadends simultaneously. Release gas into new lines at a rate that will prevent formation of a hazardous mixture of gas and air or precede natural gas with a slug of inert gas.

3.02 FIELD QUALITY CONTROL

- A. The Contractor shall test all gas mains with 90 p.s.i.g. air and show that the lines are leak free, prior to the initiation of gas service. Each day's work shall be tied into the preceding

day's work and tested overnight. A pressure-time gauge with a range no greater than 0 - 200 p.s.i.g. and in good working order shall be furnished by the Contractor. All testing shall comply with D.O.T. Title 49, Part 192, Transportation of Natural and Other Gas By Pipeline: Minimum Federal Safety Standards."

- B. The location of the project along with the temperature at the time the test pressure is placed upon the pipe shall be recorded on the pressure chart. The pressure charts shall be given to the DPW or the designated representative of the DPW on a daily basis. In order to facilitate daily testing, appropriate testing apparatus shall be used. Leaks shall be repaired in a manner approved by the DPW or the designated representative of the DPW before additional lengths of pipe that need to be tested are added to the main.
- C. If service lines are installed at the same time as the mains, then service lines shall be included in the testing of the mains. If service lines are installed after gas service has been initiated, then the Contractor shall test each service line individually to stand up to an air test of 90 p.s.i.g. for twenty (20) minutes. If a leak is discovered, then the Contractor shall immediately make the appropriate repairs, in a method approved by the DPW or the designated representative of the DPW. All existing service lines that are disconnected from the main temporarily shall be tested as if they are new lines before being placed back into service.
- D. A 24-hour test shall be placed on the entire system of mains prior to initiation of gas service. If a portion of the gas service has met the requirements of the leak test and it is possible for the other sections to be tested independently, then the DPW or the designated representative of the DPW may approve initiation of gas service for that portion.

END OF SECTION