

CITY OF PORT ARANSAS GAS DEPARTMENT

INSTALLATION SPECIFICATIONS

NATURAL GAS DISTRIBUTION SYSTEM



REVISION 3.1119

These written specifications are intended to ensure adequate protection for the public and to prevent natural gas pipeline accidents and failures.

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1 GENERAL TERMS AND CONDITIONS

1.1 Purpose

These written specifications are intended to ensure adequate protection for the public and to prevent natural gas pipeline accidents and failures.

The Transportation of Natural Gas and Other Gas by Pipeline: Department of Transportation (DOT) regulations in Title 49 Code of Federal Regulation (CFR) Part 192 specifies the Minimum Federal Safety Standards for any proposed natural gas facility designed, constructed, tested, and operated. In addition to the minimum design standards in Title 49 CFR Part 192, it includes specifications for; design requirements, pipeline material qualifications, personnel qualifications, and internal, external, and atmospheric corrosion requirements.

The Texas Administrative Code (TAC) Title 43 Part 1, §21.40 Underground Utilities – specify the minimum requirements for any proposed natural gas facility installed in a Texas State Right of Way.

It shall be the responsibility of the Contractor and its agents to become familiarized with all reference standards, regulations, requirements, and codes, including the plans and specifications.

1.2 Scope

The Contractor and its agents shall furnish all materials, equipment, qualified labor, and documentation required to successfully complete the project, unless otherwise specified in these specifications.

This specification establishes the limits of applicability and describe how it will be applied and enforced. Additionally, it describes the minimum requirements for:

- *polyethylene gas pipe*
- *gas fittings*
- *gas valves and extension boxes*
- *excess flow valves*
- *tracer wire*
- *wire connectors*
- *service risers*
- *meter assembly pipe nipples and fittings*
- *trench and fill*
- *minimum Contractor qualifications*
- *equipment*
- *compliance testing*
- *modification of existing natural gas yard lines to accommodate relocation of gas meters*
- *other related equipment, materials, and fittings*
- *documentation*

All installation of the City of Port Aransas Natural Gas Distribution System by the Contractor and its agents shall be performed in accordance with all reference standards in these specifications, while meeting or exceeding the minimum standards of Title 49

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CFR §192, §199, §40, and 43 TAC §21.40.

1.2.1 Customer Owned Piping

All installation of Private systems (Customer owned piping) by the Contractor or its agents shall meet or exceed the minimum relevant requirements of:

- NFPA 54/ANSI Z223.1 or NFPA 58
- ASME B31.8 or the latest Edition of the International Fuel Gas Code
- the Local Municipal Code

1.3 Engineered and Approved Plans

All natural gas distribution system piping construction shall be performed in accordance with engineered construction plans for the work prepared under the direction of the City of Port Aransas Gas Department Director and Professional Engineer.

Construction Plans shall conform to the applicable requirements of the City of Port Aransas Gas Department, these specifications, and the U.S. Department of Transportation Pipeline Safety Regulations; Title 49, Code of Federal Regulation §192, §199, §40 and 43 TAC §21.40.

1.4 Qualification of Natural Gas Distribution System Contractors

Contractor and its agents performing work on the City of Port Aransas natural gas distribution system shall have

a drug testing program in place for all covered employees as defined in the *Pipeline Safety Regulations, Code of Federal Regulation Title 49 Part 199 "Drug Testing Pipeline Safety" And Part 40 "Procedures for Transporting Workplace Drug Testing Programs."* A total number of the Contractor's and its agents covered employees shall be submitted to the City of Port Aransas Gas Department that meet the criteria as defined in Title 49 CFR Part 199.3 and will be subject to verification of all pre-employment drug testing, random drug testing, and post-accident drug/alcohol testing that is performed during any given calendar year. In addition, the Contractor and its agents shall submit a Business Tax Identification Number (BTIN) to the City of Port Aransas Gas Department prior to commencement of the project.

1.5 Reference Standards

Where all or part of any Federal, ASTM, ANSI, NFPA, etc...; standard specification is incorporated, the reference standard shall be the latest edition and revision.

1.6 Licenses and Permits

A licensed and bonded Contractor shall perform all underground natural gas distribution system piping construction work.

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The Contractor shall secure all necessary permits unless otherwise specified under contract before commencing construction.

The Contractor and its agents Covered Employees shall have all Licenses and Qualification credentials on site and readily available during all construction phases.

1.7 Inspections

The City of Port Aransas Gas Department shall reserve the right to inspect each order upon delivery and, at the option of the City of Port Aransas, reject any items not meeting the criteria of this specification. All work shall be inspected by an Authorized Representative from the City of Port Aransas Gas Department and will have the authority to halt construction if, in his/her opinion, the specification or standard construction practices are not being followed.

Whenever any portion of the specification is violated, the Project Engineer or the Gas Utility Director shall by written notice, order further construction to cease until all deficiencies are corrected.

If the deficiencies are not corrected, performance will be required of the Contractor's surety. A copy of the order shall be filed with the Contractor's license application for future review.

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2 POLYETHYLENE PIPE AND FITTING
MANUFACTURER ASSURANCE

2.1 Polyethylene Manufacturer Quality Control

The polyethylene pipe and fitting manufacturer shall have an established quality control program responsible for inspecting incoming and outgoing materials.

Incoming polyethylene materials shall be inspected for density, melt flow rate, UV protection, 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.

Outgoing materials shall be checked for diameter, wall thickness, roundness, concentricity, toe-in, inside and outside surface finish, marking, 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 slow crack growth, pipe inside surface ductility, and ambient and elevated temperature sustained pressure testing.

The Manufacturer shall maintain records of manufacturing location, pipe production, and resin lots for at least 50 years.

2.2 Qualification of Polyethylene Manufacturers

The Manufacturer shall have manufacturing and quality control facilities that are capable of producing and assuring the quality of the pipe and/or fittings required by these Specifications.

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.

2.3 Polyethylene Compliance Tests

The Manufacturer shall certify the inspection and testing of the materials and products. In case of conflict with the Manufacturers' certifications, the Contractor, Project Engineer, or the City of Port Aransas Gas Department may request retesting by the Manufacturer or have retests performed by an outside testing service.

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All retesting shall be at the requestor's expense, and shall be performed in accordance with the Specification herein.

2.4 Interchangeability of Pipe and Fittings

Pipe and Fittings from different Manufacturers, different Material Designation Code, Pipe Category, or different SDR **shall not** be interchanged without prior authorization from the City of Port Aransas Gas Department.

Shop fabricated pipe fittings **shall not** be used without prior authorization from the City of Port Aransas Gas Department.

Side-fusion and Socket-fusion polyethylene pipe fittings **shall not** be used without prior authorization from the City of Port Aransas Gas Department.

All polyethylene Tap Tee's on the Natural Gas Distribution System shall be bonded to the main using only an Electro-Fusion method. Other methods **shall not** be used without prior authorization from the City of Port Aransas Gas Department.

2.5 Approved Manufacturers for Pipe, Fittings, Materials, and Equipment

Manufacturers that are qualified and/or approved by the City of Port Aransas Gas Department are listed below.

- *Performance Pipe – Plastic Pipe Manufacturer*
- *Kerotest – Plastic Fitting and Equipment Manufacturer*
- *Ballomax – Polyethylene and Steel Ball Valves*
- *Jomar Valves – Lockwing Brass Meter ball valves*
- *RuB, Inc. – Lockwing Brass Meter ball valves*
- *UMAC, Inc. – GasBreaker Excess Flow Valves*
- *King Innovation – Dryconn Waterproof Wire Connectors and Lugs*
- *Bingham & Taylor. – Valve extension boxes, lids, and supports*
- *Central Plastics Company – E.F. & B.F. Plastic Fittings, Gas Meter Fittings, and Equipment Manufacturer*
- *Itron – Commercial & Residential Gas Meters*
- *BelGas – Farm-Tap Field, Commercial, & Residential Gas Regulators*
- *Baker Hughes – Mooney Regulator Pressure Reducing Stations*
- *McElroy – Fusion Equipment*
- *MTD Trifusion – Fusion Equipment and Electro-fusion Fittings*
- *PLCS, Inc. – Coil Pipe Trailers*
- *SMP – Coil Pipe Trailers*
- *Reed – Tools*
- *Mustang Manufacturing, Inc. – Squeeze Tools*
- *Footage Tools – Tools and Pulling Heads*
- *Heath Consultants – Gas Detectors and Data Recorders*
- *Wika – Pressure Gauges*
- *3M – FBE Coatings, Splicing Products, and Pipe Wrap*
- *William H. Harvey Company – Pipe Wrap, Pipe Thread Compound, and Thread Seal Tape*
- *Rectorseal – PVC Solvent Cement and PVC Pipe Cleaner*

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- *Canusa-CPS – Wrapid Sleeve™ One-piece wraparound sleeve*
- *Denso North America – Pipe Wrap Primer Corrosion Protection and Sealing Technology*
- *Maloney Technical Products – Pipeline Markers, Casing Insulators, and End Seals*
- *Expansion Seal Technologies – PE and Steel Pipe Test Plugs*
- *RUST-OLEUM Corporations – 7400 System Alkyd Enamel Gray Coatings.*
- *Mesa Products Inc. – Galvanic Anodes (Aluminum, Magnesium, and Zinc)*
- *ThermOweld – Cadweld Equipment and Supplies*
- *M.C. Miller Company – Cathodic Protection Equipment*
- *Galvan Electrical – Ground Rods, Ground Rod Clamps, and Accessories*

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3 EQUIPMENT

3.1 General

The Contractor and its agents shall have all equipment necessary to install the pipe and appurtenances referred to in the Plans and Specifications.

All Contractor equipment to be used on site shall be certified by the City of Port Aransas Gas Department to be in good working condition, meet the minimum standard manufacture specifications, and suitable for the intended purpose prior to beginning each day. Additionally, equipment shall be properly maintained during project installation. Any equipment without prior certification shall be removed from the construction site.

The City of Port Aransas Gas Department will inspect the following items and reject any that are not in compliance. The City of Port Aransas Gas Department shall have the right to reject any or all equipment judged inadequate.

3.2 Trailers

The Contractor shall have trailers capable of transporting Polyethylene pipe spools and straight lengths without damaging the pipe.

3.3 Forklifts

The Contractor shall have padding for each forklift, wide non-abrasive slings,

padded clamps or padded pipe hooks. Pipe must be secured so that it cannot fall while being handled. Conventional chains, chain hooks and non-padded forklifts are expressly forbidden.

3.4 Butt-Fusion Equipment

The Contractor shall have in good working condition a Butt Fusion machine and all the required accessories capable of fusing 1" IPS – 8" IPS polyethylene pipe and have the ability to record the data for each fusion.

3.5 Electro-Fusion Equipment

The Contractor shall have in good working condition a Universal Electro-Fusion Processor that shall monitor ambient conditions and fitting output with all the required accessories capable of electro-fusing 1" IPS – 8" IPS Fittings and Data Recording each fusion.

3.6 Pyrometer

The Contractor shall have in good working condition a calibrated Pyrometer or Infrared Pyrometer, to an accuracy of 0.5% ($\pm 3^{\circ}\text{F}$) that has the ability to measure temperatures from 0°F – 500°F .

3.7 Generator

The Contractor shall have in good working condition, a Portable Electric Generator capable of meeting or exceeding the power supply of the

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equipment needed for the planned installation.

3.8 Combustible Gas Indicator

The Contractor shall have in good working condition a calibrated Combustible Gas Indicator (CGI) that is certified UL Class 1 Groups A, B, C, and D; and NFPA 54 Compliant. In addition, it shall be capable of detecting natural gas in air at one thousand parts per million (1000 ppm) or equivalent 0.1% Volume of Gas and Recording Data.

3.9 Fire Extinguisher

The Contractor shall have in good condition, a Portable 20LB ABC Fire Extinguisher; certified ANSI/UL 711 and inspected in accordance with NFPA 10.

3.10 Voltmeter and Half Cell

The Contractor shall have in good working condition a Voltmeter with Test Leads capable of recording data and a copper-copper sulfate half-cell.

3.11 Cadweld Equipment

The Contractor shall have in good working condition Cadweld-Equipment.

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4 MATERIALS

4.1 General

All gas pipe, materials, and fittings shall be new and meet or exceed the minimum requirements of all Federal, State, Local, ASTM, ANSI, NFPA, etc..., as incorporated by reference standard specifications and shall be the latest edition and/or revision.

Unless otherwise indicated on Design Plan Specifications, plastic gas pipe, along with plastic valves and fittings shall be polyethylene PE2708 material, and steel gas pipe shall be API-5L Grade B seamless construction, coated thickness of 40MIL (FBE) Fusion Bonded Epoxy.

4.2 Storage

All pipe and fittings shall be stored off the ground on wooden pallets or non-abrasive skids. The Contractor will be responsible for all dents, gouges, coating defects, and/or dimensional variations.

4.3 Trench Excavation, Bedding, and Backfill

Trench excavation, bedding, and backfill material shall be in accordance with ASTM D2488 Visual-Manual Procedures and the Unified Soil Classification System (USCS).

Native material (Sand) shall be acceptable for excavation backfill and bedding with the exception that the

material is free from all ledge rock, blacktop, sea shell, boulders, cement, large stones, organic matter, rubbish, and other equivalent debris that could damage the integrity of the pipe and/or pipe coating.

4.4 Polyethylene Pipe

Unless otherwise specified in this document "Specification for The City of Port Aransas Natural Gas Distribution System" or other approved engineering plans; **medium density** materials used for the manufacture of polyethylene pipe, casing, and fittings shall be YELLOW IPS PE2708/PE2406 meeting cell classification 234373E per ASTM D3350; and shall be Listed in Plastics Pipe Institute (PPI)-Technical Report (TR)-4 with standard grade Hydrostatic Design Basis (HDB) ratings of 1250 psi at 73°F. **High density** materials used for the manufacture of polyethylene pipe, casing, and fittings shall be YELLOW or YELLOW STRIP IPS PE3608/PE4710 meeting cell classification 445574C or 445574C per ASTM D3350; and shall be listed in PPI-TR-4 with standard grade HDB ratings of 1600 psi at 73°F.

All polyethylene pipe, casing, and fitting materials shall be yellow in color or clearly identified as **"FOR GAS USE."** Materials shall be stabilized against ultraviolet deterioration and shall be suitable for unprotected outdoor storage for at least four (4) years.

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All Polyethylene Pipe shall be IPS PE 2406 MDPE, IPS PE 2708 MDPE, IPS PE 3608 HDPE, or IPS PE 4710 HDPE, have a minimum standard dimension ratio (SDR) of 11, and shall be manufactured and tested in accordance with the latest published edition of ASTM D 2513. SDR 21, 17, 13.5, nor 11.5 **shall not** be used without prior authorization from the City of Port Aransas Gas Department.

Polyethylene pipe shall be homogeneous throughout and free of visible cracks, holes, foreign inclusions, blisters, dents, sand, dirt, mud, liquids, pipe shavings, and other injurious defects. One inch (1") IPS and two inch (2") IPS pipe shall be in coils. The coils shall be in either 500 foot or 1000 foot lengths and shall consist of a single contiguous pipe. All sizes larger than two inch (2") in diameter shall be IPS pipe and shall be in 40 foot or longer straight lengths. Straight lengths shall consist of a single length of pipe without couplings or any intermediate joints. All polyethylene pipe markings shall be legible and so applied as to remain legible under normal handling and installation practices. These markings shall consist of the word **"GAS," the designation code, the manufacture's name or trademark, the IPS size, SDR number, the pipe test category (method & value), the month and year manufactured, and identification of resin supplier.**

All Polyethylene Pipe shall be installed per manufacture and plan specifications.

4.5 Butt-Fusion Polyethylene Fittings

Polyethylene heat fusion fittings shall be manufactured and tested by the manufacturer in accordance with the latest published edition of ASTM D 2513 and ASTM D 3261, and the DOT requirements in Title 49 CFR Subpart C – Pipe Design §192.121 thru §192.123.

All polyethylene fittings shall match the same IPS, Material Designation Code, Pipe Category, and SDR as the pipe except when pre-authorized through Plan Specifications or the City of Port Aransas Gas Department.

All polyethylene fittings shall be homogeneous throughout and free of visible cracks, holes, foreign inclusions, blisters, dents, sand, dirt, mud, liquids, pipe shavings, and other injurious defects.

4.6 Electro-Fusion Polyethylene Tap Tees, Couplings, and Fittings

Electro-fusion polyethylene fittings shall conform to the latest edition of ASTM F1055 and be manufactured in accordance with the latest edition of ASTM D2513.

All Electro-fusion polyethylene fittings shall be IPS and be used at every tap tee outlet to connect gas service lines,

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installed per manufacture and plan specifications.

4.7 Excess Flow Valves

Excess Flow Valves (EFV) shall comply with Title 49 CFR Part 192.381, ASTM F2138, and the Manufacturers Standardization Society (MSS) SP 115. In addition, EFV's shall be factory tested in accordance with ASTM F1802 to assure it performs within the designated trip flow and bypass flow ranges.

Each EFV shall be fixed or anchored to the interior of the fitting to preclude movement of the valve and shall be installed per manufacture and plan specifications.

4.8 Polyethylene Ball Valves

Polyethylene ball valves shall meet or exceed the requirements of Title 49 CFR Part 192.145, ANSI/AMSE B16.40, ASTM D 2513, and ISO 9002 approved. In addition, all polyethylene ball valves shall be Full-Port and supplied with the Butt End outlets that match the pipe SDR, have a full open IPS bore, have a fused body shell or one piece molded, and **shall not** have metal parts. The construction materials for each Polyethylene Ball Valve shall be installed per manufacture and plan specifications and conform to the following:

- *Body: Polyethylene*
- *Ball: Polypropylene*
- *Stem: Acetal*
- *Wrench Adapter: Polypropylene*

- *Ground Water Seal: Neoprene*

4.9 Valve Boxes, Supports, and Lids

Handley Valve Boxes and Supports for Polyethylene Ball Valves – Extension Valve Boxes and Supports used on the City of Port Aransas Natural Gas System shall seal tight and comply with Title 49 CFR §192.179, §192.181, §192.193, and §192.365, or equal and pre-approved, and shall be installed per manufacture and plan specifications.

All Polyethylene Valves installed shall be accompanied by a seal tight valve extension box made of a non-corrosive material and a magnetically locatable lid marked **"GAS"** yellow in color.

Each polyethylene extension valve box used for two inch (2") thru four inch (4") polyethylene valves shall be heavy duty, installed per manufacture and plan specifications, and conform to DOT requirement Title 49 CFR Part 192.181(c)(3), and contain the following:

- *Slip-type design to protect from downward pressure (shall not be a twist lock type)*
- *Lock-in vandal resistant pentagon bolt on the lid*
- *Vent hole on the lid*
- *Magnetically locatable lid*
- *Have a two and three-quarter inch (2¾"), four inch (4"), and six inch (6") Pipe knock-out molds or cut-away arches*

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- *Have a one and one-half inch (1½") cast iron flange for off-road installations*
- *Have a five inch (5") cast iron heavy-duty flange for in road installations*
- *Full throat/unobstructed six inch (6") inside diameter (ID) upper tube with a twelve inch (12") ID bell*
- *one inch (1") polyethylene valves shall have a full throat/unobstructed four inch (4") ID upper tube with a six inch (6") ID bell*
- *A valve support shall be installed for all one inch (1") thru four inch (4") polyethylene valves.*

4.10 Tracer Wire

Tracer wire shall be a #12 AWG HS-CCS high-strength copper clad steel conductor (HS-CCS); insulated with a 30 mil, high-density, high molecular weight polyethylene (HDPE) insulation, and rated for direct burial use at 30 volts. HS-CCS conductor must be a 21% conductivity for locating purposes; Break load 600# minimum. HDPE insulation shall be RoHS compliant and utilize virgin grade material.

Insulation color shall meet the APWA color code standard "Yellow" for identification of buried gas utility. Tracer wire shall be Copperhead™ HS-CCS, HDPE 30 mil insulation made in the USA or equal and pre-approved, and shall be installed per manufacture and plan specifications.

4.11 Wire Connectors and Junction Boxes (Lugs)

King-Innovation® DryConn Gas Utility Wire Connectors and Lugs – Wire

Connectors and Lugs used on the City of Port Aransas Natural Gas System shall be pre-filled with dielectric sealant that will never harden and shall be; UL 486-D Listed as a sealed wire connector for use in damp, wet, rain-tight, and direct bury or equal and pre-approved, and shall be installed per manufacture and plan specifications.

4.12 Electrical Grounding Rods and Clamps

5/8" Copper Clad Ground Rods and Heavy-Duty Bronze Alloy Ground Clamps (Hex-Head) #12 Solid UL listed approved for direct burial or equal and pre-approved shall be used on the City of Port Aransas Natural Gas System, installed per plan specifications.

4.13 Transition Fittings

All Transition Fittings shall meet or exceed the requirements of ASTM D2513 category 1, ASTM F1973, ANSI B 1.20, ANSI B 31.8 and Title 49 CFR Part 192. All transition fitting's shall be installed per manufacture and plan specifications.

4.14 Anodeless Service Supply Risers

Pre-bent fabricated anodeless service risers shall meet or exceed the requirements of ASTM D2513, ASTM F 1973, ANSI B 1.20, ANSI B 31.8, DOT Title 49 CFR Part 192.281, and NFPA-58.

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All anodeless risers shall be fabricated from casing materials that meet or exceed ASTM A513 and ASTM A53 schedule 40, type F steel pipe. The casing shall also conform to the following requirements:

- *Gray, fusion bonded, epoxy coated (8 mil minimum thickness)*
- *Sixty inches (60") long*
- *MIPT outlet*
- *Crimp gasket moisture seal*

Additionally, the casing pipe shall be bent to a ten inch (10") minimum radius resulting in a thirty inch (30") horizontal by thirty inch (30") vertical configuration.

A ten inch (10") long IPS PE pigtail shall extend from the steel pipe casing. All IPS carrier pipes shall be yellow PE2708/PE2406 Polyethylene for 60 psig and lower or yellow/yellow strip PE3608/PE4710 for 60 psig thru 100 psig.

The transition from steel to PE shall occur within five inches (5") of the (outlet) threaded end for one inch (1") risers and six and a-half inches (6½") for two inch (2") risers. Risers shall include insulation between the steel casing and PE carrier pipe by means of an O-ring/air space configuration or by the use of a sleeve made of non-heat conducting materials.

4.15 Brass Meter Ball Valves

Jomar Lockwing Gas Service Ball Valve
175-LWIN – 100% Full Port, 175 psig

service designation, maintenance free 1" and 2" Brass meter valves used on the City of Port Aransas Natural Gas System; installed per manufacture and plan specifications.

Meter ball valves shall meet or exceed all applicable parts of DOT Title 49 CFR Part 192 and ANSI B16.33. Meter ball valves shall conform to the following:

- *Threads shall conform to ANSI B1.20.1*
- *Shall be corrosion resistant with T.E.A. Ternary Eco Alloy treatment or applied AGA painted gray finish*
- *Maintenance free*
- *Brass packing gland*
- *304 stainless steel screw*
- *Shall have a tamper resistant bass lock-wing cap*
- *Brass body and end connections*
- *Chrome plated brass ball*
- *Brass stem*
- *Rigid EPDM packing*
- *Female x Female threads*
- *100% full port*
- *TFM 1600 seats*
- *Double Viton Stem O-rings*
- *100% leak tested*
- *Design pressure of 175 psig*
- *Design temperature range: -40°F to 366°F*

4.16 Meters and Regulators

The City of Port Aransas Gas Department will supply all Natural Gas Regulators and Meters. The Contractor shall install all Natural Gas Regulators and Meter in accordance to manufacture specifications. The Contractor shall supply all pipe nipples, fittings,

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equipment, and materials necessary to install meter assemblies as per plan specifications.

4.17 Pipe Wrap Tape

William H. Harvey Printed, "10mil 3M™" Corrosion Protection Pipe Wrap Tape – Wrap Tape or equal and pre-approved shall be used on the City of Port Aransas Natural Gas System applied per plan specifications.

4.18 Steel Pipe

Steel Pipe Specifications – Seamless Grades B (API 5L X60 PSL2) Plain or beveled end, 12 mil Scotchkote™ 206N Fusion Bonded Epoxy (FBE) Coating and resilient to cathodic protection currents or equal and pre-approved, and shall be installed per plan specifications.

4.19 Steel Flanges

Each Carbon Steel Forged Flanges per ASTM A105, Raised Face, Weld Neck or NPT (female) ASME/ANSI B1.20.1, Class 300, Standard per ASME/ANSI B16.5, procedure for calculating the dimensions for pressure flanges ASME/ANSI B31.8 or equal and pre-approved, and shall be installed per ASTM and AWS Standards for Welding. Studs, nuts and bolts shall be as specified by the flange manufacturer.

4.20 Steel Ball Valves

Fully welded Carbon Steel Ball Valves used on the City of Port Aransas Natural Gas System, above or below ground, shall meet or exceed the minimum requirements of API 6D. The valve manufacture shall be ISO Certified in accordance with the current edition of ISO 9001. Additionally, each carbon steel valve shall conform to the following:

- *¼ turn operations*
- *304 stainless steel ball and stem*
- *Contain 2" square operating nut*
- *A locking plate with stoppers to prevent over turning*
- *25% Carbonized PTFE (Teflon™) Seats rated to -20°F*
- *Zinc coated stem bearings*
- *Contain a Serial Number on the body or plate*
- *Regular Port*
- *Flanged Class 300 ASME/ANSI B16.5 or NPT (female) ASME/ANSI B1.20.1*

Steel Valves shall be Ball Valves and equal to those as manufactured by Broen Ballomax or pre-approved by the Gas Utility Director.

All underground Steel Ball Valves installed shall be accompanied by a seal tight valve extension box made of a non-corrosive material and a magnetically locatable lid marked "**GAS**" and yellow in color.

Each extension box used for two inch (2") thru four inch (4") underground steel ball valves shall be heavy duty,

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installed per manufacture and plan specifications, and conform to DOT requirement *Title 49 CFR Part 192.181(c)(3)*, and contain the following:

- *Slip-type design to protect from downward pressure (shall not be a twist lock type)*
- *Lock-in vandal resistant pentagon bolt on the lid*
- *Vent hole on the lid*
- *Magnetically locatable lid*
- *Have a two and three-quarter inch (2¾"), four inch (4"), and six inch (6") Pipe knock-out molds or cut-away arches*
- *Have a one and a-half inch (1½") cast iron flange for off-road installations*
- *Have a five inch (5") cast iron heavy-duty flange for in road installations*
- *Full throat/unobstructed six inch (6") inside diameter (ID) upper tube with a twelve inch (12") ID bell*

4.21 Pipeline Encasements

Contractor shall install commercial available casing insulators with a minimum of four (4) plastic runners; each runner shall be installed at five feet (5') maximum intervals on the carrier main prior to inserting into the casing. Insulators shall be sized to center the gas main in the casing.

4.21.1 City Right of Ways

Encasements crossing the City right of ways shall be HDPE marked "GAS" and 2 times the diameter of the carrier distribution piping from right-a-way line to right-a-way line when practical

or near pipeline lateral: when the planned Maximum Allowable Operating Pressure (MAOP) is 60psig or lower. When the planned maximum allowable operating pressure is greater than 60 psig, casing shall be of welded joints, schedule 40, coated steel, cathodically protected, and designed with vents located at both ends that are protected from insects and prevent water from entering the casing, placed near the right of way line immediately above the pipeline.

4.21.2 State Right of Ways

Encasements crossing the Texas State Right of Way shall be of welded joints, schedule 40, and cathodically protected coated steel 2 times the diameter of the carrier piping from right-a-way line to right-a-way line when practical or near pipeline lateral and designed with vents located at both ends that are protected from insects and prevent water from entering the casing, placed near the right of way line immediately above the pipeline.

4.21.3 Water Ways

Each Polyethylene carrier gas main crossing a waterway measuring ten feet (10') to seventy five feet (75') in width from its crests shall be encased in yellow or yellow striped HDPE marked "GAS" and 2 times the diameter of the carrier distribution piping when the planned MAOP is less than 60 psig and shall extend ten feet (10') past the crest of the waterway. When the planned MAOP of the carrier main

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is greater than 60 psig, it shall be encased in an all welded joints, schedule 40, coated steel, catholically protected, and designed with a High End vent, located; one foot (1') from the end of the casing. Encasement shall extend twelve feet (12') past the crest of the waterway. Waterway encasement crossings greater than seventy five feet (75') in width from its crests shall comply to "Encasements crossing the Texas State Right of Way."

Each Steel Encasement shall have installed a Cadweld Bonded, Galvanic Cathodic Protection Sacrificial Anode Bed located at the lower end of the casing.

4.22 Corrosion Protection Coating

Steel pipe coating shall be factory applied; one-part, heat curable, thermosetting powdered, 12 mil Scotchkote™ 206N Fusion Bonded Epoxy (FBE) Coating and resilient to cathodic protection currents or equal and pre-approved.

All repairs, Cadweld bonding, and welded joint sections shall be grinded smooth of surface irregularities and weld spatters than Sleeved with the Canusa one-piece Windoweld Wrapid Sleeve™ or equal and pre-approved.

All steel welds on valves and fittings shall be grinded smooth of surface irregularities and weld spatters, coated with one-part, heat curable, thermosetting powdered, 12 mil Scotchkote™ 206N Fusion Bonded Epoxy (FBE)

Coating or equal, and pre-approved. Coating shall be field applied to all welded valves and fittings and shall be heated and cured in accordance with the manufacture specifications.

4.23 Atmospheric Corrosion Protection Coating

RUST-OLEUM 7400 SYSTEM Machine Tool Gray Alkyd Enamel Paint – Coating for aboveground apparatuses or equal and pre-approved shall be used on the City of Port Aransas Natural Gas System applied in accordance with manufacture specifications.

4.24 Sacrificial Anodes

Sacrificial Anodes used on the City of Port Aransas Natural Gas System shall comply with ASTM B843, standards for MAG High Potential Anodes.

Magnesium Anodes shall be packed in a permeable cloth bag, have a minimum 15 foot long #12 AWG type Solid Copper Lead Wire Conductor, silver soldered to a perforated galvanized steel strap core. The Contractor shall install in accordance with the manufacture procedures.

4.25 Meter Assemblies: Pipe Nipples and Fittings

The City of Port Aransas Gas Department does not use any particular USA Manufacture for Pipe Nipples and Fittings.

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The following specifications or equal and pre-approved shall be used when making a determination for all 1" thru 2" pipe nipples and fittings. Bushing Reducers **shall not** be allowed on Natural Gas Systems.

Pipe nipples and fittings shall be manufactured in the USA and shall be installed per manufacture specifications.

- *1" thru 2" Welded Carbon Steel Pipe Nipples ASTM A53, NPT ASME/ANSI B1.20.1, Standard ASTM A733, Class 150, Schedule 40 Hot Dip Galvanized ASTM A153.*
- *1" thru 2" Malleable Iron Pipe Fittings per ASTM A197, NPT ASME B1.20.1, Standard ASME/ANSI B16.3, Class 150, and Type III per ASTM B633 with a trivalent zinc top coat.*
- *1" thru 2" Malleable Iron Unions per ASTM A197, NPT per ASME B1.20.1, Standard per ASME/ANSI B16.39, Class 150, Hot Dipped Galvanized per ASTM A153, brass to iron seat.*

Pipe nipples and fittings for meter assemblies include, but are not limited to the following: Nipples 1" thru 12" in length, Elbows; 90° & 45°, Full/Half Couplings, Square Head Plugs, Hex Head Plugs, Caps, Tees, Reducer Tees, Bell Reducers. Gas meter Connections: 1 1/4" Meter Swivel Sets and 20LT Meter Swivel Sets.

4.26 PVC Solvent Cement

Rectorseal Hot™ 203L PVC Solvent Cement – PVC Solvent Cement used on the City of Port Aransas Natural Gas

System shall meet or exceed ASTM D2564, blue in color, fast setting; able to handle 30 psig of gas pressure after 15 minutes, and have the application temperature tolerates of 40°F to 120°F or equal and pre-approved, and shall be applied per manufacture specifications.

4.27 PVC Cleaner

Rectorseal Jim™ PR1L PVC Cleaner – used on the City of Port Aransas Natural Gas System shall meet or exceed ASTM F656, and have the application temperature tolerates of 40°F to 120°F or equal and pre-approved, and shall be applied per manufacture specifications.

4.28 Pipe Thread Compound

Harvey Seal Formula 55 – Pipe thread compound used on the City of Port Aransas Natural Gas System shall meet or exceed the temperature tolerates of -50°F to +400°F and gas pressures to 3000 psi or equal and pre-approved, and shall be applied per manufacture specifications.

4.29 Thread Seal Tape

Harvey Yellow Gas Line PTFE – Thread seal tape used on the City of Port Aransas Natural Gas System shall meet or exceed the temperature tolerates of -450°F to +500°F and gas pressures to 10,000 psi or equal and pre-approved, and shall be applied per manufacture specifications.

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5 JOINING

arc welding process and the following requirements shall apply:

5.1 Heat Fusion

The Contractor shall ensure that all its covered employees making heat fusion joints have been qualified in accordance with Title 49 CFR §192.285. Heat Fusion Joining (Butt-Fusion or Electro-Fusion joints) on polyethylene gas piping shall be in accordance with Title 49, Code of Federal Regulations §192.283.

The Contractor shall maintain records of each qualified covered employee, and shall certify that qualification training was received not more than 12 months before commencing construction.

The City of Port Aransas Gas Inspector must be present during all pipe fusions to insure that all required procedures are adhered to and to witness the quality of each joint.

At the City of Port Aransas Gas Department's discretion, the Contractor will remove fusion(s) and supply it for random testing to insure quality control.

5.2 Steel Joining (Welding)

The City of Port Aransas shall perform all joining of steel pipes and fittings, unless otherwise noted in the Bid Documents. When the Contractor is required to join steel pipe and fittings it shall be done by the shielded metal

5.2.1 Welding Procedures

All welding, including welder qualification testing, shall be done following City Utilities written welding procedure specification (which complies with API 1104), or Contractor may submit for approval his own written welding procedure and procedure qualification records with his bid documents. The Gas Director shall determine acceptability of submitted procedures based on API 1104 in advance of welder qualification testing. If Contractor has submitted his own procedure, he must have his procedure qualified per API 1104 and all welding shall be done by competent welders who shall have been tested by an AWS certified welding inspector approved by the City of Port Aransas. The welding test shall comply with the requirements of 49 CFR Subpart E and API 1104 and shall be administered by a welding inspector certified by the American Welding Society to have complied with the requirements of Section 6.1 of AWS QC1-88, "Standard for AWS Certification of Welding Inspectors."

5.2.2 The Contractor shall arrange and pay for all welder and procedure qualification testing. This expense is coincident with the installation of steel gas main and shall not be considered grounds for additional charge to the City of Port Aransas. Contractor may choose to use an

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AWS inspector or testing company of their choice and submit result documents to the Gas Director for approval.

5.3 Steel Joining (Threads)

Threaded joints shall not exceed the nominal diameter of NPS two inch (2"). The dimensional standards for pipe threads are given in ASME B1.20.1 which includes the number of threads per inch, pitch diameter, and normal engagement lengths for all pipe diameters.

All Threaded fittings shall be of carbon steel coated galvanized and NPT tapered male and female threads shall be sealed with Teflon tape or Thread Jointing Compound applied per manufacture specifications.

5.4 Plastic Adhesive Joining

Plastic pipe shall not be joined by thread or by miter joints. Plastic other than Polyethylene shall be joined by solvent cement that complies with ASTM D2564-96a and applied per manufacture specifications. Pipe cleaner is never to be used on ABS piping.

5.5 Joining by Other Means

The use of joining by other means within the gas distribution system shall **necessitate approval** by the City of Port Aransas Gas Department.

Polyethylene gas pipe and fittings may be joined together, or to other materials by transition fittings, electro fusion fittings, or fully restrained mechanical couplings under assured conditions. These types of fittings shall be designed for joining polyethylene to another material. When joining by other means, the installation instructions of the joining type fitting shall be observed, and the Contractor's Covered Employees shall be Qualified under Title 49 Code of Federal Regulations §192.805 & §192.807 for the installation of these types of joining procedures.

When mechanical OD couplings (Category 1 only) 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.

The use of polyethylene fusion **socket** fittings is **not permitted** to be used on the City of Port Aransas Gas Distribution System.

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6 INSTALLATION

6.1 Trench Excavation, Trench Bedding, Burial Depth, Underground Clearance, and Backfill

Trench excavation, bedding, and backfill shall be in accordance with ASTM D2488 Visual-Manual Procedures and the Unified Soil Classification System (USCS), the material specifications, and plans or as otherwise authorized in writing by the Project Engineer or the Gas Utility Director.

Burial depth shall be in accordance with these specifications and the applicable federal, state, and municipal code or as otherwise authorized in writing by the Project Engineer or the Gas Utility Director.

6.1.1 Trench Excavation

The Contractor shall remove excess groundwater. Where necessary, trench walls shall be shored or reinforced. All necessary precautions shall be taken to ensure a safe working environment and to protect the public.

6.1.2 Trench Bedding

Trench bedding shall be on grade and be a stable foundation. Unstable trench bottom soils shall be removed, and a six inch (6") bedding of compacted clean sand SP shall be filled to pipe bottom grade.

A trench cut in sea shell or stony soil shall be excavated to six inches (6") below pipe bottom grade, and brought back to grade with a compacted clean sand SP bedding.

All ledge rock, blacktop, sea shell, boulders, cement, large stones, organic matter, rubbish, and other equivalent debris that could damage the integrity of the pipe and/or pipe coating shall be removed prior to pipe installation.

6.1.3 Burial depth

Burial depth of piping shall have at least twenty-four inches (24"), but not greater than thirty inches (30") of cover in private property, and at least thirty-six inches (36"), but not greater than forty-eight inches (48") of cover in all City of Port Aransas right-of-ways, measured vertically from the top crown of the pipe to the top of the proposed grade.

In Texas State Right of Ways: the burial depth for longitudinal placement of Polyethylene pipelines operating below 60 psig shall have at least thirty-six inches (36"), but not greater than forty-eight inches (48") of cover, measured vertically from the top crown of the pipe to the top of the proposed grade.

Polyethylene pipelines operating below 60 psig that cross a paved Texas State Right of Way shall be encased in a welded joints, schedule 40, catholically protected coated steel and have

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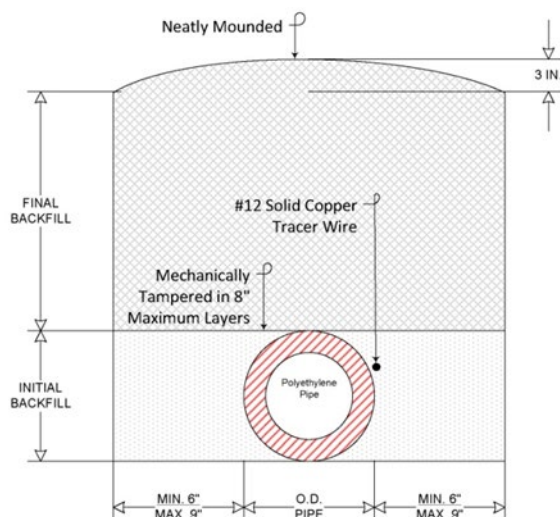
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a minimum burial depth of thirty inches (30"), but not greater than forty-eight inches (48") of cover, measured vertically from the top crown of the casing to the top of the outside pavement structure. Each Encasement shall be designed with vents located at both ends, placed at or near the right of way line immediately above the casing.

6.1.4 Underground clearance

Gas distribution piping shall be installed with a minimum of twelve inches (12") of clearance from any underground utility, or proposed utility, and a minimum of twenty-four inches (24") of clearance from any structure not associated with the gas distribution pipe.

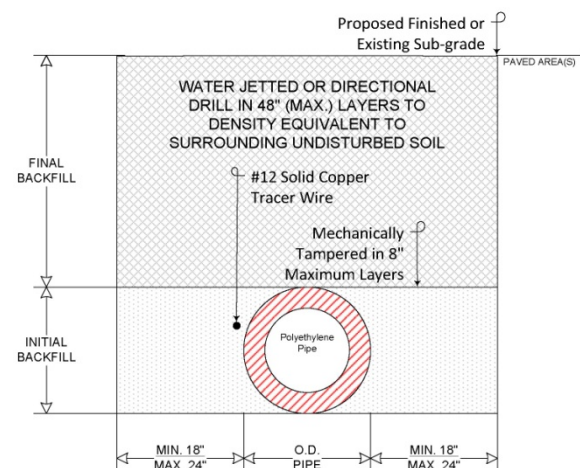
If clearance cannot be attained, the pipeline must be encased and have enough clearance to be protected from damage that might result from other utility excavations, from the proximity of the other structures, and



to allow the required space for future maintenance or repairs of the newly installed Gas distribution pipe. This alternative shall **necessitate approval** by the City of Port Aransas Gas Department.

6.1.5 Backfill

Trench excavations shall be immediately backfilled after the pipe, valves, fittings, and weld joint locations are recorded, unless other protection is directed or indicated. The Contractor shall restore the surface improvements to the pre-construction condition.



Backfill in layers of two inch (2") – four inch (4") clean sand, embedding to the top crown of the pipe and mechanically tamper to a density equivalent of not less than 100% of an ASTM D698 Proctor Curve. Native soils may be used provided that the embedment material soil type and particle size is in accordance with ASTM D 2774. Embedment shall be placed and compacted to at least 90% Standard Proctor Density in six inch (6") lifts

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to at least six inches (6") above the pipe crown. During embedment placement and compaction, care shall be taken to ensure that the haunch areas below the pipe spring-line are completely filled and free of voids.

Tracer wire shall be placed alongside within two inches (2") of the polyethylene pipe. Final backfill shall be placed and compacted to finished grade.

6.1.6 Directional and Non-Directional Boring

Contractor shall locate all underground utilities by pothole prior to the start of any installation of pipe casing or carrier pipe by bore. Tracer Wire shall be attached to all Polyethylene pipe prior to insertion of the borehole or casing.

All pipe ends shall be sealed with an end cap or similar fitting authorized by the City of Port Aransas Gas Department prior to pulling it into a borehole or casing.

6.2 Gas Pipe, Valves, Fittings Inspection and Installation

Gas distribution piping shall be installed in accordance with Title 49 CFR Part 192, Subpart G (Mains), Subpart H (Service lines), applicable codes and regulation, 43 TAC §21.40, and ASTM D2774.

In the event of damage, immediately make all repairs and replacements to

the approval of the City of Port Aransas Gas Inspector.

6.2.1 Pipe Handling

When material is delivered, a receiving inspection shall be performed, and any shipping damage shall be reported no later than 7 calendar days to the supplier or manufacturer and no later than 24 hours from discovery to the City of Port Aransas Gas Department.

The Contractor shall protect the gas pipe from debris or liquids from entering the pipe at all times. Incidents shall require air purging, sponging, and/or pigging of the pipe segment that is contaminated. Procedures shall be at the discretion of the City of Port Aransas Gas Inspector.

6.2.2 Handling Polyethylene Pipe

Polyethylene Pipe that has scratches, notches, cuts or any other abrasions the exceed 10% of the pipe wall thickness shall be removed and discarded. *Care shall be taken not to cause scuffing or gouging of the polyethylene pipe surface while transporting, loading, unloading, or installing.* The City of Port Aransas Gas Inspector shall be notified of all defects and subsequent repairs.

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.

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6.2.3 Polyethylene Pipe Storage

Coils and bundles of polyethylene pipe shall be stored two inches (2") off the ground and stacked in a way to prevent them from slipping or collapsing, which could cause damage the polyethylene pipe. Temporary end-caps shall be placed on polyethylene pipe ends during storage to prevent ingress of contamination.

Polyethylene pipe shall be stabilized against ultraviolet deterioration and shall be suitable for unprotected outdoor storage for a minimum of four (4) years.

Bending radius shall be fifty times (50x) the outer pipe diameter. Fittings **shall not** be allowed in pipe bends.

Underground clearance shall be in accordance with the specifications herein or as otherwise authorized in writing by the Project Engineer or the Gas Utility Director.

Installation of polyethylene piping shall not exceed the maximum depth in accordance with the specifications herein, unless affirmed on the plans or authorized by the Gas Utility Director.

6.2.4 Polyethylene Pipe Installation

The Contractor shall inspect the polyethylene pipe for abnormalities during installation.

The Contractor shall ensure that all persons making heat fusion joints on the City of Port Aransas Natural Gas Distribution System are qualified in accordance with Section 5 "JOINING." Butt Fusion shall be performed between two pipe ends, or pipe ends and fitting outlets that have the same outside diameter and are not different in wall thickness. Transitions between unlike wall thickness shall only be made by means of electro-fusion.

The minimum long term cold bending radius for polyethylene pipe SDR 11 is twenty five times (25x) the outer pipe diameter. If fusions are present in the bend the minimum long term cold

6.2.5 Protecting Polyethylene Pipe 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 saddle tap, branch saddle, or tapping tee on a main pipe, and where pipes enter or exit casings or retaining walls. The area surrounding the connection shall be embedded in properly placed, compacted back-fill, preferably in combination with a protective sleeve or other mechanical structural support to protect the polyethylene pipe against shear and bending loads.

6.2.6 Butt-Fusion Polyethylene Fittings (Installation)

All Butt-Fusion Polyethylene Fittings shall be inspected for visible cracks,

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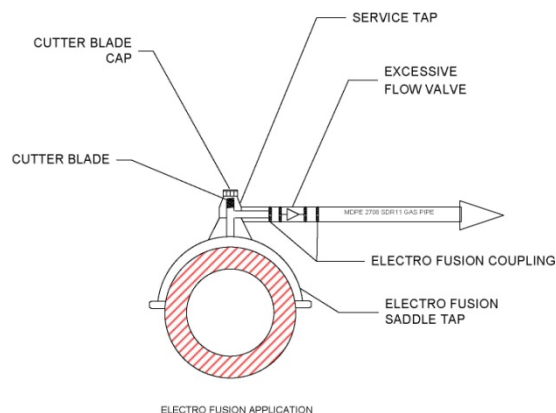
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holes, foreign inclusions, blisters, dents, sand, dirt, mud, liquids, pipe shavings, and other injurious defects prior to butt-fusion.

Butt-Fusion shall be performed as described per manufacture fitting installation procedures.

6.2.7 Electro-Fusion Polyethylene Tap Tees, Couplings, and Fittings (Installation)

All Electro-Fusion Polyethylene Fittings shall be inspected for visible cracks, holes, foreign inclusions, blisters, dents, sand, dirt, mud, liquids, pipe shavings, and other injurious defects prior to electro-fusion.



All polyethylene main taps on the City of Port Aransas Natural Gas System shall be an Electro-Fusion Saddle Tap w/Butt-Fusion Outlet.

Electro-Fusion shall be performed as described per manufacture fitting installation procedures.

6.2.8 Excess Flow Valves (Installation)

Excess Flow Valves (EFV) shall be butt-fusion by butt-fusion installed between every residential tap and gas service line as specified on the detail drawings in the specifications and shall be installed per manufacture instructions.

All EFV's installed on the City of Port Aransas Natural Gas Distribution System shall be tagged with the; manufacture name, capacity range, and flow direction. In addition, a stainless steel tag indicating the flow capacity of the EFV shall be securely attached to the gas riser.

6.2.9 Polyethylene Ball Valves, Boxes, Supports, and Lids (Installation)

Polyethylene ball valves shall be Full-Port and supplied with the Butt End outlets that match the pipe SDR and have a full open IPS bore.

All Polyethylene Ball Valves shall be installed per manufacture instructions and engineered plans.

All Polyethylene Valves installed shall be accompanied by a seal tight valve extension box made of a non-corrosive material and a lid marked **"GAS"** and yellow in color.

Each valve extension box shall be finished with an eighteen inch (18") circumference by four inch (4") thick cement ring around the lid and the ad-

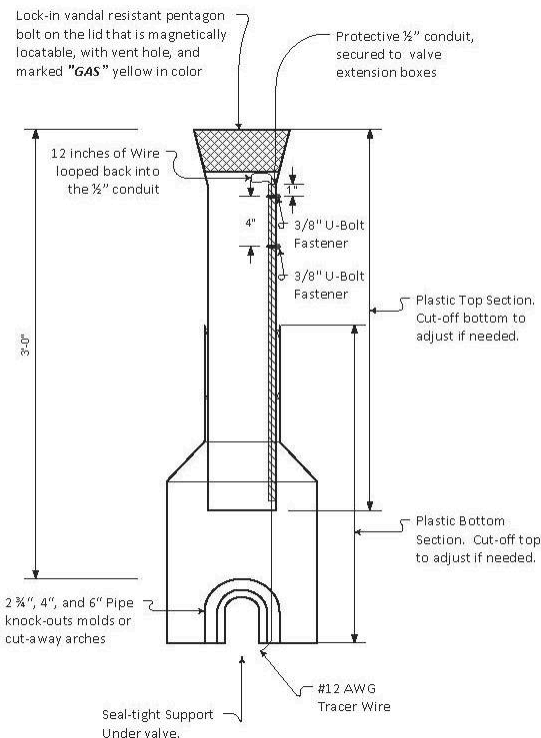
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justment height set flush to the proposed grade without disturbing the polyethylene ball valve.

Each polyethylene extension valve box used for two inch (2") thru four inch (4") polyethylene valves shall be installed in accordance to the detail drawing and plan specifications.



Valve supports shall be installed for all one inch (1") thru four inch (4") polyethylene valves.

6.2.10 Tracer Wire, Wire Connectors, Junction Boxes (Lug), and Grounding Rods

One (1) tracer wire end shall be stripped and firmly connected to a Junction Box (Lug), firmly attached to a bare portion of the continuous solid tracer wire.

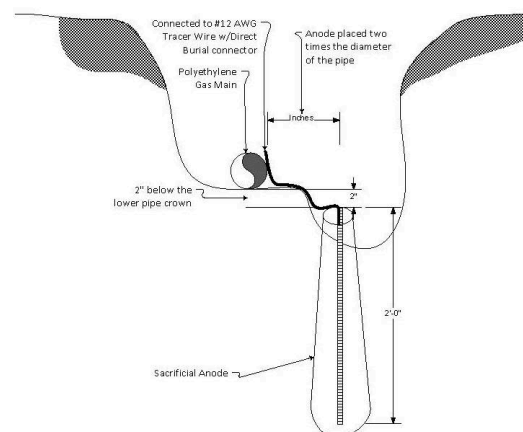
Two (2) tracer wire ends shall be stripped and pre-twisted prior to installing water proof Wire Connectors and connector shall be firmly tightened.

Three (3) or more tracer wire ends shall be stripped and firmly connected to a Junction Box (Lug) firmly attached to the bare portions of the continuous solid tracer wire.

All tracer wire connectors and lugs shall be firmly wrapped with a layer of Approved Corrosion Protection Pipe Wrap Tape.

Installed tracer wire shall be connected to existing main tracer wire at all tie-ins and placed alongside within two inches (2") of all new polyethylene pipe and shall extend up to grade in a protective one-half inch (1/2") conduit, secured to all valve extension boxes and anodeless service risers.

At every main end cap and lateral, the tracer wire shall be firmly connected to a twenty-four inch (24") long by



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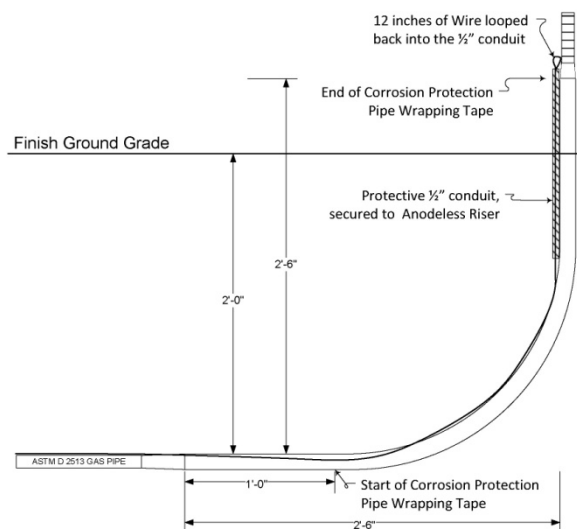
five-eighths of an inch (5/8") diameter electrical grounding rod, with a ground rod clamp suitable for direct burial applications. The electrical grounding rod shall be placed at a distance of two (2) times the diameter of the pipe in inches and buried vertically, two inches (2") below the lower pipe crown as specified in detailed plan.

6.2.11 Transition Fittings (Installation)

On all installed Transition fittings, a layer of Approved Corrosion Protection Pipe Wrap Tape shall be firmly applied by over lapping no greater than one inch (1") on the casing surface. Transition fittings shall be installed per manufacture instructions and plan specifications.

6.2.12 Anodeless Service Supply Risers

Only one inch (1") and two inch (2") pre-bent risers shall be used on the gas distribution system and installed



per manufacture instructions and plan specifications.

On all installed anodeless risers, a layer of Approved Corrosion Protection Pipe Wrap Tape shall be firmly applied by over lapping no greater than one inch (1") on the casing surface as specified in the plan details. All anodeless risers shall be installed per manufacture instructions and Specifications.

6.2.13 Brass Meter Ball Valves

Meter ball valves shall be installed upstream of each gas meter on all anodeless service risers and sized to match the pipe threads of the anodeless service riser.

6.2.14 Meter Assemblies (Installation)

The Contractor shall install all pipe nipples and fittings to build all meter assemblies. All gas meters and regulators shall be installed by the Contractor in accordance with the manufacture instructions and Specifications. An Approved Atmospheric Corrosion Protection Coating shall be applied to each assembly after installation.

The gas service pressure shall be set to the existing; as otherwise set to seven inches of water column (7"W.C.) or as advised by the City of Port Aransas Gas Inspector.

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6.2.15 Handling Coated Steel Pipe

Coated Steel Pipe that has scratches, notches, or any other abrasions on the pipe coating shall be repaired in accordance with the specifications herein. *Care shall be taken not to cause scuffing or gouging of the pipe coating while transporting, loading, unloading, or installing.* The City of Port Aransas Gas Inspector shall be notified of all defects and subsequent repairs.

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.

6.2.16 Coated Steel Pipe Storage

Coated Steel pipe joints shall be stored two inches (2") off the ground and stacked in a way to prevent them from slipping or collapsing, which could cause injury to personnel or damage the steel pipe coating. Temporary end-caps shall be placed on pipe ends during storage to prevent ingress of contamination.

Coated Steel Pipe shall be stabilized against long term atmospheric exposure and shall be stacked in such a way as to prevent rolling, abrasions, impact damage where the pipe touches, and stress stacking that can deform the pipe diameter.

6.2.17 Coated Steel Pipe Installation

The Contractor shall inspect the coating on the steel pipe for abnormalities during and after installation.

The Contractor shall ensure that all persons welding joints on the City of Port Aransas Natural Gas Distribution System are certified in accordance with Section 5 "JOINING." Steel welding shall be performed between two pipe ends, or pipe ends and fitting outlets that have the same outside diameter and are not different in wall thickness.

Coated steel pipe bends **shall not** be permitted; only by directional welded fittings such as 90° Ell, 45° Ell, etc...

Underground clearance shall be in accordance with the specifications herein or as otherwise authorized in writing by the Project Engineer or the Gas Utility Director.

Installation of coated steel piping shall not exceed the maximum depth in accordance with the specifications herein unless affirmed on the plans or authorized by the Gas Utility Director.

6.2.18 Casings

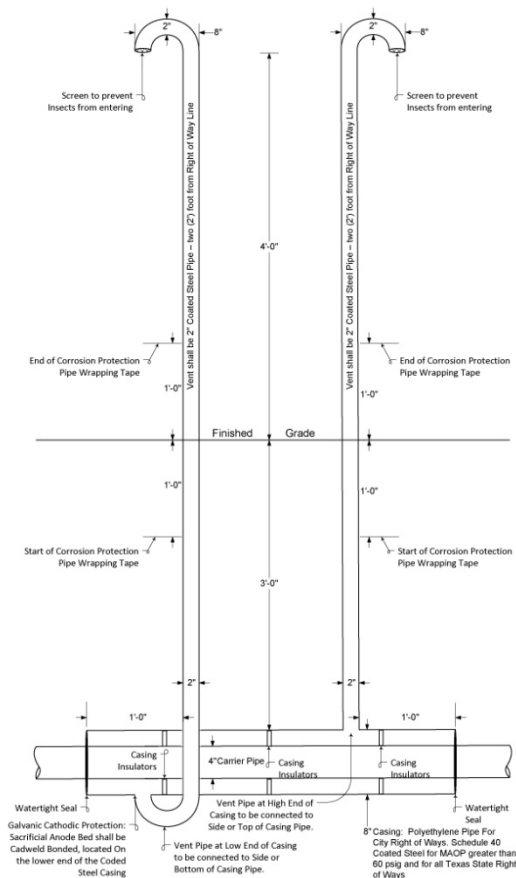
Encasements shall be installed in accordance with the specifications herein and the detail drawing. Each Steel Encasement shall have installed a Cadweld Bonded, Galvanic Cathodic Protection Sacrificial Anode Bed located at the lower end of the casing.

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Contractor shall install commercial available casing insulators with a minimum of four (4) plastic runners; each runner shall be installed at five feet (5') maximum intervals on the carrier main prior to inserting into the casing. Insulators shall be sized to center the gas main in the casing.



6.2.19 Field Applied Coating on Steel Pipe Welded Joints, Repairs, Cadwelds, Valves, and Fittings

The Contractor shall grind all welded joint surfaces of irregularities and weld spatters to a bare steel surface prior to applying a complete one piece, heat shrinkable, wraparound of

80 mils with a one-piece yellow closure polyethylene backing, the width shall be twelve inches (12") and suitable for below ground applications. Sleeve shall be the Canusa one-piece Windoweld Wrapid Sleeve™ or equal and pre-approved.

All coating repairs and Cadweld joints shall be grinded smooth of surface irregularities and weld spatters then coated with one-part, heat curable, thermosetting powdered, 12 mil Scotchkote™ 206N Fusion Bonded Epoxy (FBE) Coating or equal and pre-approved. Coating shall be field applied to all coating repairs and Cadweld joints and shall be heated and cured in accordance with the manufactures' specifications.

All steel welds on valves and fittings shall be grinded smooth of surface irregularities and weld spatters, coated with one-part, heat curable, thermosetting powdered, 12 mil Scotchkote™ 206N Fusion Bonded Epoxy (FBE) Coating or equal and pre-approved. Coating shall be field applied in accordance with the manufactures' specifications to all welded valves and fittings.

RUST-OLEUM 7400 SYSTEM Machine Tool Gray Alkyd Enamel Paint Coating or equal and pre-approved shall be applied in accordance with manufacture specifications to all aboveground apparatuses installed on the City of Port Aransas Natural Gas System.

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6.3 Cathodic Protection (CP)

There are several important elements required to designing a cathodic protection system.

A sacrificial MAG anode bed with a designed life of 10 years shall be installed where coated steel pipe is not connected to the impressed current cathodic protection system.

6.3.1 CP Design

The following preliminary data must be gathered: the soil resistivity, length, and diameter of the Coated Steel pipe. One other element required is the coating efficiency on the steel pipe. The coating manufacture will supply the coating resistance value.

The mentioned information above will be needed to calculate the size of sacrificial MAG anodes required for obtaining the amount of current density to change the potential of the steel pipe to -0.85 volts as measured between the Steel and a saturated copper-copper sulfate reference electrode in contact with the electrolyte.

The soil resistivity range within the City of Port Aransas is 0 to 2000 ohm-cm (corrosively severe).

In most circumstances, the average current density required for cathodic protection was 2 milliamperes per square feet to obtain a desired current.

The Contractor shall seek approval from the Gas Utility Director on all Cathodic Protection Designs.

6.3.2 Sacrificial MAG Anode Installation

Sacrificial MAG anodes shall be installed in accordance with the computation of all design factors.

Installation shall be in a vertical position, deep enough to be in permanently moist soil. Each anode shall be buried no less than ten feet (10') laterally from the pipe. The top of the anode shall be at the same grade level as the lower pipe crown.

The insulated wire shall be stripped and the solid copper connection shall be Cadwelded to a bare section of the steel pipe and coated according to the specifications herein.

6.4 Gas Main Dehydration

The Contractor shall be responsible for installing gas piping in a manner that does not allow water to enter the pipe. If the Inspector determines there is water in any gas piping, the Contractor shall be responsible for pigging that pipe in a manner approved by the Resident Engineer. The pipe shall be pigged repeatedly by the Contractor until the Resident Engineer has determined that the pipe is sufficiently dehydrated. Pipeline pigs shall be Girard Polly Pig YBS-B, KRG or equal. Contractor shall supply all pigs. Inspector shall inspect pig after passage through pipe to determine if that

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pig may be reused. Contractor shall be responsible for blocking passage of pig into pipes which do not need to be pigged. If pig passes into a pipe which does not need to be pigged, or if pig becomes stuck in the pipe, the Contractor shall retrieve the pig at his own expense, including but not limited to any excavation, pipe repair and landscape or pavement restoration. If there is water in any gas piping, the Contractor shall be responsible for dehydration of the line as directed by the Inspector and to the Inspector's satisfaction.

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7 CUSTOMER OWNED NATURAL GAS
PIPING AND FITTINGS

7.1 Description

The Contractor shall coordinate with the City of Port Aransas Building Department for all required permits and inspections of customer owned natural gas piping for homes located in Port Aransas, TX. All inspections shall be scheduled with the Building Department at least two (2) working days in advance.

The work to be performed shall consist of furnishing all tools, equipment, materials, supplies, manufactured articles, transportation, and services (including fuel, power, and communication), labor, and other operations necessary.

Modification to existing customer owned natural gas piping, fittings, or shut-off valves shall require pressure testing of the installation and approval from the City of Port Aransas Building Official.

The work shall be complete and performed in strict accordance of the authority having jurisdiction.

All applicable codes, ordinances, and standards set by legal constituted authority shall be the responsibility of the Contractor. And shall be paid for by the Contractor.

7.2 Existing Gas Plumbing

The modification of the existing gas plumbing shall be performed by the contractor only after receiving written approval from the City of Port Aransas Building Department.

With the City of Port Aransas Building Official's authorization the Contractor shall perform all repairs and modifications required for code compliance of existing natural gas plumbing.

7.3 Coordination with Gas Customers

The Contractor is responsible for coordinating access to private property with the property owner / resident.

The Contractor shall notify the City of Port Aransas Gas Department and the property owner / resident at least 7 days in advance of performing work. Prior to starting work at a specific location the Contractor shall schedule the work with the property owner / resident, as the customer or agent presence during the work is required.

The standard delivery pressure downstream of a residential regulator and gas meter is seven inches in water column (7" w.c.). Non-standard delivery pressures above 7" W.C. shall require advance approval from the City of Port Aransas Gas Department. Non-standard delivery pressures above 7" W.C. will be limited to 3 psig.

The Contractor shall re-light all pilot lights the same day after installing the

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new or existing gas meter assemblies. The City of Port Aransas Gas Department shall supply all regulators and meters to the Contractor.

No gas Customer shall be left out of service overnight. Each gas customer shall be reconnected and all pilot lights re-lit before 5:00 PM each day.

7.4 Cooperation with the City of Port Aransas Building Department

The City of Port Aransas Building Official or designee shall have access to the work at all times and all locations where the work is in progress. Contractors shall provide such access to enable the City of Port Aransas Building Official or designee to perform their functions properly.

All changes or revisions in the construction schedule shall be coordinated with the Building Department.

7.5 Attributable Delays due to Obstructions or Incomplete Work

When the City of Port Aransas Building Official is ready to inspect, but is prevented due to unfinished work, all extra charges attributable to the delay will be charged to the Contractor at the City of Port Aransas Building Departments discretion.

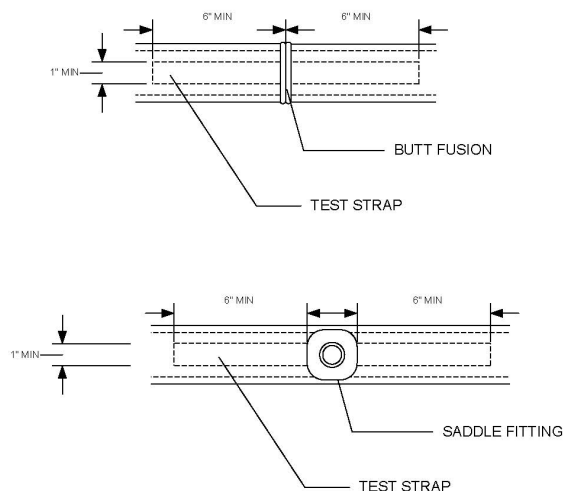
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8 TESTING

8.1 Trial Fusions

A trial fusion shall be performed at the beginning of each day to verify fusion procedures and that equipment settings are accurate for the actual jobsite conditions. Upon request by the City of Port Aransas Gas Department, the Contractor shall verify field fusion quality by making and testing a trial fusion.

The following procedures are in accordance to ASTM D 2657: allow trial fusion to cool completely before cutting straps and testing by bending the straps until the ends touch. The City of Port Aransas Gas Department will determine whether the test specimen is appropriate. Figure 1 illustrates ASTM D 2657 test specimen dimensions for bent strap testing.



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 then shall re-make the rejected fusions.

8.2 Leak Testing

Tie-ins shall be Leak tested no sooner than two (2) minutes after activation with a calibrated Combustible Gas Indicator. A City of Port Aransas Gas Department Representative shall be present during all Tie-ins and Leak Testing. Contractor shall give 48-hour notice prior to commencement of any Tie-ins.

The polyethylene gas distribution system is subject to DOT Pipeline Safety Regulations and shall be tested in accordance to Title 49 CFR §192.513 as applicable.

The Contractor shall take all precautions to eliminate hazards to persons and property near lines being tested. Testing of all polyethylene gas pipe segments shall be for a minimum of two hours under the supervision of a City of Port Aransas Gas Department Inspector.

8.3 Pipe Testing

The Contractor shall test all sizes of Polyethylene Pipe spools at one hundred (100) psig for a minimum duration of 30 minutes prior to installation. During the test, the temperature of the Polyethylene Pipe material shall not be more than 100°F. All pre-

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installation testing of Polyethylene Pipe **not** installed within seven (7) calendar days shall require a new test prior to burying. A City of Port Aransas Gas Department Inspector shall be present during pre-installation pipe testing. Straight length pipe joints **do not** require pre-installation pipe testing.

All sizes of Polyethylene Pipe installed shall be tested in accordance with Title 49 CFR §192.513 and shall be tested at one hundred and fifty percent (150%) of the plan design maximum allowable operating pressure (MAOP) for a minimum duration of 24 hours. During the test, the temperature of the Polyethylene Pipe material shall not be more than 100°F. The pressure shall not decrease during the test period. Test shall be performed on each segment of main installed after service installation is completed.

All steel carrier pipe testing shall be performed in accordance with the applicable regulations in Title 49 CFR Subpart J and shall be tested at one hundred and fifty percent (150%) of the plan design maximum allowable operating pressure (MAOP) for a minimum duration of 24 hours. The pressure shall not decrease during the test period. Test shall be performed on each segment of main installed after service installation is completed.

A City of Port Aransas Gas Department Inspector shall be present at commencement and the completion

of the test for verification. The Contractor shall not expel the test medium without the City of Port Aransas Gas Department Inspector present; otherwise, the test shall be invalidated.

All failures discovered during the test period shall be reported to the City of Port Aransas Gas Inspector prior to repairing and retesting.

The Contractor shall notify the City of Port Aransas Gas Department 48 hours in advance of any pipe testing.

8.4 Testing Tracer Wire

The Contractor shall perform a continuity test on all tracer wire installed in the presence of a City of Port Aransas Gas Department Representative. If the tracer wire is found to be discontinuous after testing, the Contractor shall repair or replace the failed segment(s) of tracer wire at their own expense.

8.5 Purging

All new and re-activated pipelines shall be purged of air in accordance to this specification. Purging of air with natural gas is the process of displacing air within a pipeline or pipeline section and should always be performed with caution. If the gas cannot be introduced in a moderately rapid continuous flow, a slug of inert gas shall be introduced into the pipeline before the natural gas is.

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The point of discharge shall be controlled with an approved shut-off valve, no greater than half (1/2) the size of the pipe diameter. The discharge point shall be located at least ten feet (10') from all sources of ignition, building openings, and twenty five feet (25') from mechanical air intake openings.

During purging operations of introducing gas, the open point of discharge shall be continuously attended and monitored with a combustible gas indicator (CGI) and shall not be finalized until eighty percent (80%) gas by volume or greater is detected.

All abandoned or deactivated pipelines shall be purged of gas. Purging of gas with air is the process of displacing air within a pipeline or pipeline section and should always be performed with caution. If the air cannot be introduced in a moderately rapid continuous flow, a slug of inert gas shall be introduced into the pipeline before the air is.

The point of discharge shall be controlled with an approved shut-off valve, no greater than half (1/2) the size of the pipe diameter. The discharge point shall be located at least ten feet (10') from all sources of ignition, building openings, and twenty five feet (25') from mechanical air intake openings.

During purging operations of introducing air, the open point of discharge shall be continuously attended

and monitored with a combustible gas indicator (CGI) and shall not be finalized until one percent (1%) gas by volume or less is detected.

A City of Port Aransas Gas Department Inspector shall be present during all purging of pipelines. Contractor shall give 48-hour notice prior to commencement.

During the purging process the Contractor shall have a qualified individual (fire watchman) with an approved 20LB ABC Fire Extinguisher up wind at the ready in case of ignition.

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9 ABANDONMENT OR DEACTIVATION

The Contractor shall return all gas meters and regulators at the completion of the project to the:

9.1 General

The Contractor shall conduct abandonment or deactivation of natural gas pipes in accordance with Title 49 CFR §192.727.

City of Port Aransas
625 W. Avenue A
Port Aransas, TX 78373.

The Contractor shall notify the City of Port Aransas Gas Department 48 hours prior to conducting an abandonment or deactivation.

9.4 Reuse of Abandoned Pipe, Valves, and Fittings

The Contractor ***shall not*** be allowed to reuse abandoned pipe, valves, or fittings for any part of this project.

For each natural gas pipe abandoned or deactivated in place; the Contractor shall disconnect from all sources and supplies of natural gas and purge all inactive natural gas pipes in accordance with Section 8. All pipe ends shall be permanently sealed, capped, or plugged and documented accordingly.

9.5 Customer Owned Materials Removed

It shall be the responsibility of the Contractor to dispose of all Customer owned materials that are removed from operation.

9.2 Removal

The Contractor shall permanently remove all ***below ground and above ground*** City of Port Aransas Natural Gas Distribution System facilities that are abandoned and deactivated in accordance with the engineer plans.

9.3 Recovered Materials

It shall be the responsibility of the Contractor to dispose of all City of Port Aransas Gas Distribution System abandoned materials that are removed from operations with the exception of Gas Meters and Regulators.

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10 DOCUMENTATION

10.1 Pipe Record Reports

The Contractor shall make a record of each pipe spool, pipe joint, fitting and tracer wire installed under these requirements; additionally, the Contractor shall make a record of each re-activated segment(s) pipe.

In duplicate these records shall be given to the City of Port Aransas Gas Department to be retained for the useful life of the pipe system.

- *Project Name*
- *Pipe/Fitting Manufacture,*
- *Material Designation Code,*
- *Pipe/Fitting Category,*
- *Linear feet of Pipe installed, re-activated, and abandon.*
- *Location by Swing Ties for all Polyethylene Valves, Underground Fittings, and Lateral Segments*
- *As built plans and GPS coordinates in electronic format.*

10.2 Pipeline Test Record Reports

The Contractor shall make a record of all pipeline tests, required for; pre-installed spool polyethylene pipe and all installed polyethylene pipe. Each test record shall contain at minimum, the following information:

- *Operator Name: City of Port Aransas Gas Department*
- *Operator Address: 710 W. Avenue A, Port Aransas, TX 78373*
- *Project Name*
- *Contractor Name*

- *Covered Employee Name*
- *Contractor Address, State, & Zip Code*
- *Contractor Phone Number*
- *Date of Pipe Test*
- *Location of Pipe: Address or Block Number(s) and Street Name, or Street Name and Intersection to Intersection where Pipe is being Tested or Segment Name*
- *Type of Test (Replacement, Extension, Pre-installation, or re-activation)*
- *Test Medium Used*
- *Test Pressure (Beginning and Ending)*
- *Test Time (Beginning and Ending)*
- *Size of Pipe being Tested*
- *Amount of Pipe in Linear Feet*
- *Pressure recording charts, or other record of pressure readings*
- *Leaks or Failures, if any discovered*
- *Repairs made to any Leaks or Failures recorded*
- *Printed Name, Date, and Signature of the Person performing the Test*
- *Printed Name, Date, and Signature of Gas Department Inspector*

All pipe that is pressure tested by the Contractor shall require a mechanized or manual device suitable to record pressure losses of one tenth psig (0.10) during a 24 hour period.

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10.3 Abandonment / Deactivation records

The following information shall be recorded on a report for each segment abandoned and deactivated:

- *Operator Name: City of Port Aransas Gas Department*
- *Operator Address: 710 W. Avenue A, Port Aransas, TX 78373*
- *Project Name*
- *Contractor Name*
- *Covered Employee Name*
- *Contractor Address, State, & Zip Code*
- *Contractor Phone Number*
- *Date of Abandonment or Deactivation*
- *Pipe manufacture*
- *Pipe material type*
- *Pipe designation code*
- *Pipe size*
- *Linear feet of pipe abandoned or deactivated*
- *Printed Name, Date, and Signature of the Person in charge of performing the Purge*
- *Printed Name, Date, and Signature of Gas Department Inspector*

10.4 Fusion Data Logging

The Contractor shall electronically or manually data-log all fusion joints. The parameters that shall be recorded at minimum are as follows:

- *Project Name*
- *Date & Time*
- *Technician Name*
- *Equipment Type & Unit #*
- *Fusion #*
- *Ambient Temperature*

- *Iron Temperature (achieved only with a pyrometer)*

10.4.1 Fusion Serialization Numbering

The Contractor shall permanently mark the Fusion# at the joint on the pipe for all fusions. Each fusion# shall consist of the following serialization code number:

- *Weld No. (start with 1 every new day)*
- *Tech ID#: last two (4) digits of Welder Qualification ID.*
- *Month & Day*
- *Year*

<i>Weld No.</i>	<i>Tech ID#</i>	<i>Month & Day</i>	<i>Year</i>
1	8098	9/25	2013
<i>Weld No.</i>	<i>Tech ID#</i>	<i>Month & Day</i>	<i>Year</i>
26	2477	9/25	2012

Example:

Tech #8098 [01809892513]

Tech #2477 [26247792512]

The Inspector shall verify 10% of all serialization code numbers for accuracy and permanency.

10.5 Purge Record

The contractor shall manually log the following data on the appropriate form supplied by the City.

- *Pipe Record*
- *Pipe Test Record*
- *Abandonment / Deactivation Record*
- *Fusion Data Log (record)*