SECTION 15210
GAS STEEL PIPELINE CONSTRUCTION

PART 1. GENERAL

1.1 The work to be performed shall consist of the installation of high-pressure steel natural gas pipelines.

1.2 CODES

The following codes shall be interpreted as the minimum requirements applicable to the subject work, and no statement contained in this Specification shall be construed as limiting the work to such minimum requirements. Any requirements stated herein which violate these codes or governmental regulations shall immediately be brought to the attention of OWNER for resolution. The latest editions and addenda of the codes listed shall govern all work. The editions and addenda of the codes referenced in the latest version of the Code of Federal Regulations, Title 49 shall govern all work.

A. ASME/ANSI B31.8, Gas Transmission and Distribution Piping Systems.

B. Code of Federal Regulations, Title 49, Part 192, Transportation of Natural and Other Gas by Pipeline.

PART 2. PRODUCTS

2.1 OWNER-FURNISHED MATERIALS

OWNER-furnished materials shall be available to CONTRACTOR at OWNER's warehouse or at the job site when delivery by the product vendor is necessary.

2.2 CONTRACTOR-FURNISHED MATERIALS

CONTRACTOR shall furnish and provide at the site the following materials and supplies, exclusive of other materials named, and all other items not specifically listed as furnished by OWNER. OWNER reserves the right to approve the source of supply and manufacturer of all materials furnished by CONTRACTOR that will enter into the permanent construction. CONTRACTOR shall not place orders for any materials of this type until OWNER has had the opportunity of exercising this option. All materials furnished by CONTRACTOR and entering into the permanent construction shall be new and of the Specifications prescribed by OWNER. CONTRACTOR shall make all arrangements for ordering, receiving and storing materials.

A. Pipe shall be API 5L X42. Pipe 4 inches to 8 inches diameter shall have a wall thickness of 0.1880 inches; pipe 12 inches in diameter and larger shall have a wall thickness of 0.250 inches. Pipe will be coated with 14-16 mils of fusion bonded epoxy coating. For bores the pipe will be also be coated with 40 to 50 mils of powercrete coating.

B. All valves and valve boxes. Valves will be weld-by-weld unless otherwise stated in the scope of work or project drawings.

C. All anodes and test station materials.

D. Fittings as specified in the scope of work and project drawings. Any additional fittings will be provided by CONTRACTOR.

E. Welding equipment and all miscellaneous welding materials including welding rod.

F. Fittings necessary for the completion of the project, in addition to the number of fittings to be supplied by OWNER specified in the scope of work or project drawings.

G. Equipment, coating, primer and wrapping materials for coating all pipe installed below grade not furnished coated by OWNER. This includes field joints, valves, and repairing damaged coatings of underground facilities. Shrink sleeves shall be as specified in section 3.6.2.

H. Equipment, paint, primer and paint thinner for painting all aboveground facilities, and blasting materials.

I. All test lead material.

J. Suitable fill dirt or sand for protecting pipe coating. Rockshield shall only be used with OWNER's approval. Rockshield shall be as specified in Section 3.8.10

K. Nitrogen for pipeline pressure test.

L. All tools and equipment necessary or required to complete the Project and all timbers or other materials required to store, move or erect pipe, piping, structures, and other facilities and equipment.

M. All expendable materials and supplies required for construction of Project.

N. Weld caps, valves, blind flanges, and materials for test manifolds required to facilitate pressure tests of fabricated pipe sections.

O. All pigs for cleaning the pipeline.

P. Cable, ground rods, and all other material to ground pipe near high-voltage equipment.

Q. All tools, equipment, and machinery necessary for construction as considered necessary in the opinion of OWNER's Representative. This includes equipment necessary to test welders and holiday detectors.

PART 3. EXECUTION

3.1 CONTRACTOR'S RESPONSIBILITIES

A. CONTRACTOR shall haul and string the pipe along the right-of-way and furnish skids with cushions. The pipe shall be handled in a manner to prevent damage to the pipe walls, pipe ends and coating. Slamming against adjacent pipe or equipment shall be prohibited. CONTRACTOR shall inspect all coating as the pipe is off-loaded from the trucks. Any damage discovered after the pipe is off-loaded is CONTRACTOR's responsibility.

B. CONTRACTOR shall provide a welder's certified by OWNER procedure for OWNER approval prior to the start of work. Qualification of welders to be done by CONTRACTOR.

C. CONTRACTOR shall jeep the pipe coating and repair all damaged coating, and prime and wrap all field joints with shrink sleeves, furnished by CONTRACTOR and approved by OWNER. Below-

ground fittings and valves shall be coated in accordance with Section 9.4 and aboveground pipe, valves, and fittings shall be coated in accordance with Section 9.5. Pipe repair by use of heat-applied epoxy sticks, heat-applied tape coating, or heat-applied shrink sleeves shall be as specified in Section 3.8.2.

D. CONTRACTOR shall pressure test the pipelines to the specified pressure for a minimum of twenty-four (24) hours, or longer if specified in the Scope of Work or drawings, utilizing pressure and temperature recorders and a certified deadweight tester. OWNER-accepted certified chart and all deadweight readings shall be furnished to OWNER.

E. CONTRACTOR shall clean the pipelines by running enough squeegees and polypigs with an air compressor, nitrogen or gas as specified by OWNER to satisfy OWNER's Representative that the line is ready to transport natural gas.

F. CONTRACTOR shall install anodes and test stations along the pipeline during construction as specified in section 3.13.

3.2 RECEIVING, HAULING AND STRINGING

This section shall include the receiving, loading, unloading, storing, handling, hauling and stringing of all materials from the time of their delivery to CONTRACTOR until the final installation of the materials in the job.

A. CONTRACTOR shall store the pipe in a manner that will prevent the pipe and coating from being damaged and which will prevent the pipe from rolling. CONTRACTOR shall store the pipe in a manner acceptable to OWNER's Representative.

E. All equipment used in handling coated pipe, fabrications, or fittings shall be adequately padded to protect the coating.

F. Coated pipe shall be protected by padding on skids in such a manner that the coating will not be damaged by foreign matter lying on the ground. If bare skids are used, they are to be placed only under the bare pipe where the coating is cut back at the ends of each joint.

G. CONTRACTOR shall furnish the necessary materials and cover the ends of all sections of welded pipe with end seals of a type approved by OWNER. Water-tight end seals shall be furnished in sections through low, wet areas and where pipe has been lowered into the trench but not immediately tied-in.

3.3 TRENCH

A. A flat-bottom trench shall be dug to widths called for below and shall be at a depth to provide a 48-inch minimum cover over pipe, unless a greater minimum depth is specified in the Project drawings. For dirt excavation, the minimum trench width shall be 12 inches or 2 times the nominal pipe diameter whichever is greater. For rock excavation, the minimum trench width shall be 12 inches or 3 times the nominal pipe diameter whichever is greater.

Where more than one (1) pipeline is to be installed in the same trench, minimum trench width will be determined by the sum of the pipeline outside diameters, plus a 24-inch minimum between pipelines, and plus a 6-inch minimum between pipeline and trench side, unless specified otherwise in the project drawings.

B. The minimum depth of cover over pipe installed in the natural bottoms of all waterways shall be 6 feet below bottom of waterway unless otherwise specified in the drawings or Scope of Work.

C. The minimum vertical distance between the top of the proposed pipelines and the bottom of all existing pipelines shall be 24 inches unless specified otherwise on the project drawings. The elevation required to attain this 24-inch minimum clearance or the clearance specified otherwise under existing pipelines shall be maintained across the entire width of right-of-way of the existing pipeline. CONTRACTOR shall notify all pipeline companies to be crossed prior to trenching operations.

D. CONTRACTOR shall carefully preserve all stakes set by OWNER's Representative, and shall be liable for any excessive expense due to its failure to exercise care in the maintenance of such stakes.

E. The trench shall be carefully graded by hand where it is necessary to meet the above Specifications and to provide an even bed for the pipe. At over bends and side bends CONTRACTOR shall excavate the trench to provide clearance between the inside bend of the pipe and the bottom side of the trench.

F. All roots, buried timber, and rock encountered in the trench line shall be cut back far enough so that in no instance shall they come in contact with the pipe. No chips or parts of stumps or rocks shall be left in the trench.

G. CONTRACTOR shall pad the trench or install rockshield as directed by OWNER's Representative at locations where the bottom of the trench is in rock or has hard protrusions capable of damaging pipe coating. The trench bottom must be padded with 6 inches of select material free of rocks or clods greater than 1 inch in any dimensions. OWNER shall have final authority as to padding requirements. The trench must be of sufficient depth to accommodate padding, pipe, and specified cover.

H. At road crossings where conditions will permit, the trench on both sides shall be dug in such a manner that the pipe will be sloped in from normal grade to road crossing grade. The trench across the road right-of-way and for a minimum distance of 30 feet on both sides of the road right-of-way shall be maintained at the same grade established for the road crossing. The pipe shall not be stressed more than the allowable free bend established by OWNER, and the pipe must be adequately supported to eliminate additional bending during backfilling operations.

3.4 CASINGS

A. Casing, where required, shall be installed with care to avoid damage. CONTRACTOR shall thoroughly swab and remove all mud and debris from the casing prior to installation of the pipeline. Coating protectors shall be spaced on the pipe in accordance with the drawings. All pipe installed inside of casing shall not have a change of direction or angle within the limits of the casing. Precaution shall be taken and methods pursued during the installation of the crossings to avoid damaging the coating on the pipeline. Should the coating be damaged, the pipe shall be removed and the damaged coating repaired.

B. If casing ends seals specified by the OWNER are to be gas tight, the ends of steel casing shall be vented and sealed and corrosion test leads installed in accordance with the project drawings. CONTRACTOR shall mechanically clean the vents, prime and paint the aboveground portion of the vents and wrap the underground portion of the vents with a pressure sensitive protective tape to approximately 1 foot above finished grade. The tape shall be furnished by CONTRACTOR.

C. If casing ends seals specified by the OWNER are to be water tight only, the ends of steel casing shall not be vented, but corrosion test leads installed in accordance with the project drawings.

D. The ends of plastic casings shall be sealed by CONTRACTOR to prevent the entry of water or other debris using methods approved by OWNER.

D. At locations where the pipeline is installed in casing, CONTRACTOR shall support the pipeline in the vicinity of the crossing with padded skids and sandbags, or by other means acceptable to OWNER's Representative to prevent excessive settling of the pipe and possible damage to the casing seals and spacers during backfilling.

E. For steel casings, the completed installation shall be electrically tested by CONTRACTOR to assure proper insulation of the pipe from the casing prior to backfilling of the crossing and periodically as the spoil is replaced. If the installation is not properly insulated, CONTRACTOR shall locate and rectify the condition causing the contact or "short".

3.5 BORING / DIRECTIONAL DRILLING

DIRECTIONAL DRILLING

The pipeline may be installed by directional drilling when installation by open cut, bore or guided bore is not feasible, and OWNER agrees that directional drilling is the best alternative, or where specified by the Scope of Work or Project Drawings.

A. The minimum length of a directional drill shall be determined by the minimum allowable bending radius for free stress required by the specifications. The depth of the required crossing and the angles of entry and exit, and it shall be agreed between OWNER and CONTRACTOR. Normal depth of a directional drill shall be determined by the specific location requirements.

B. Pipe coating shall be a minimum of 14 to 16 mils of fusion bond epoxy (FBE), 40 to 50 mils of Powercrete coating or equivalent, and field joints shall be protected with special heat shrink sleeves for the directional drills as approved by OWNER. An alternate coating may be specified in the Scope of Work, or may be requested by CONTRACTOR for OWNER approval.

C. CONTRACTOR shall furnish to OWNER in writing for approval the type of drilling fluid and its source, and shall designate the disposal method and location of disposal of drilling fluids.

E. CONTRACTOR shall furnish OWNER with a copy of the drilling log and an as-built plan and profile of the carrier pipe within three (3) weeks of completion of the directional drill.

E. CONTRACTOR shall pressure test all pipeline sections to be installed by directional boring for a minimum of 4 hours prior to installation. The test shall be conducted as required by section 3.11. The pipeline section pretest requirement may be waived with the written approval of OWNER’s Project Engineer.

3.6 BENDING

This section shall include all work required to make a pipe to conform to the trench.

A. The pipe shall not be stressed more than the allowable free bend established by OWNER. Free bend shall be limited to the following:

$$R = 100 \times d$$

where: d = pipe O.D. (inches). All other bends shall be made with the use of a bending machine.

B. CONTRACTOR shall make all necessary pipe field bends required in the construction of the pipeline. OWNER may, at its own option, furnish or require CONTRACTOR to furnish factory elbows for installation.

C. All field bends shall be made without heating and by the use of a bending machine of proper size and type as approved by OWNER. Heated or wrinkle bends will not be allowed. Free stressing or free bends will be allowed only to the limits specified in 3.6.A. of these specifications.

D. The degree of bend in steel pipe is limited to and shall not exceed 1.0 degree per lineal length equal to one pipe diameter along the longitudinal axis of the pipe. This degree of bend may be reduced for specific projects, subject to pipe specifications, coatings and/or OWNER specifications.

E. If the pipe is double-jointed, field bends shall not be closer to the circumferential weld than one pipe diameter.

F. All completed field bends shall show no evidence of buckling, wavy surface, or excessive reduction of wall thickness at any point. Any pipe bends showing evidence of sagging where the difference between the maximum and minimum diameters is in excess of 2.5 percent of the nominal diameter shall be cut out and replaced by CONTRACTOR at no extra expense to OWNER. If in the judgement of OWNER an internally expanding mandrel is required to achieve smooth bends, CONTRACTOR shall furnish and use an internally expanding mandrel of proper size, subject to approval by OWNER.

G. CONTRACTOR shall be responsible for determining the degree of field bend necessary at all points of angularity (horizontal and vertical) in the pipeline to allow proper lay of the pipe in the trench. The proposed centerline of the easement, if shown on the Project Drawings, shall be used as a guideline for determining the degree of the required bend. CONTRACTOR may use gradual bends, where approved by OWNER, to eliminate the use of fittings.

H. On pipe containing a longitudinal seam, the longitudinal seam must be as near as practicable to the neutral axis of the bend. In all bends, the longitudinal seams shall not be in the concave or convex surfaces of the bend, but shall be on top for side bends and on side for overbends and sag-bends.

I. CONTRACTOR shall produce bends with minimum distortion of the pipe, and which in no way impairs the strength of the pipe. OWNER may require, prior to bending any pipe to be used on the Work, test specimens of all diameters and wall thicknesses of pipe to be bent to qualify CONTRACTOR's procedures and equipment. For these tests, CONTRACTOR shall furnish the labor and equipment necessary and OWNER will furnish the pipe.

J. Any pipe that is buckled or gouged by the bending operation shall be cut out and replaced at the sole expense of CONTRACTOR. Hammering or the use of jacks to reform buckled or deformed pipe is prohibited.

3.7 WELDING STEEL PIPE

3.7.1 WELDING PROCEDURES

A. CONTRACTOR shall adopt OWNER’s welding procedures, unless otherwise approved by the OWNER.

B. Prior to beginning any work, the CONTRACTOR may request to use an alternate welding procedure. Approval of an alternate welding procedure shall be at the sole discretion of the OWNER.

C. Prior to beginning any work, CONTRACTOR shall establish and qualify detailed welding procedures for the various materials in accordance with the requirements of the version of API - 1104 referenced in the latest edition of the Code of Federal Register, Title 49, Part 192. Each welding procedure shall include a welding repair procedure. The Welding Procedure Specification (WPS) and Procedure Qualification Record (PQR) shall be approved by OWNER prior to the start of construction. The development of procedures, procedure testing, and certification shall be at the sole expense of CONTRACTOR.

B. Welding procedures for installation of any valves welded in the pipeline shall be developed, qualified, and submitted as a separate and independent procedure from the pipeline welding procedures if valve and pipe materials are not identical.

C. All testing shall be performed and certified by OWNER-approved testing laboratory, agency or equivalent.

3.7.2 WELDER QUALIFICATIONS

A. All welders shall be required to pass the welding qualification test on the approved welding procedure in accordance with the requirements of API-1104. Documentation of the qualification tests for each welder to be used for the Work shall be furnished to OWNER prior to the start of welding by the welder.

B. Qualification of welders and welding operators shall be performed in the presence of OWNER's Representative or at an OWNER designated testing facility . Welders are required to be OQ-qualified and welding qualified to OWNER's welding specification or OWNER's approved specifications.

C. CONTRACTOR shall bear all expense related to qualification of welders.

D. OWNER reserves the right to retest welders during the performance of the work if there is any doubt as to the competence of the welders. Costs of such additional tests shall be paid by OWNER if tests are passed, but shall be paid by CONTRACTOR if tests are not passed.

E. OWNER reserves the right to reject the use of any welder for the Work based on the performance of the welder.

3.7.3 WELDING PROCESS

A. All pipeline welding shall conform to the requirements of API-1104, as referenced in the latest edition of the Code of Federal Register, Title 49, Part 192.

B. The low hydrogen Shielded Metal Arc Welding (SMAW) process is preferred. CONTRACTOR may submit for consideration procedures using other welding processes. The alternate procedures must be substantiated by test results indicating the acceptability of the proposed alternate processes, including weld metal hydrogen levels.

C. Gas Metal Arc Welding (GMAW) is not acceptable for material thicknesses greater than 0.375 inches.

D. Preheat requirements shall be in accordance with the requirements of API STD 1104 or ASME B31.4 as applicable. Preheat requirement shall be clearly indicated on the WPS.

3.7.4 STORAGE OF WELDING SUPPLIES

A. All electrodes shall be received from new, undamaged boxes.

B. Electrodes should not exposed to the atmosphere for more than two hours.

C. Any electrode that is damaged, damp, or exposed to the atmosphere for longer than the above limit will be discarded.

3.7.5 WELDING

A. Pipe shall be handled in a manner to prevent damage to the pipe walls, coatings, and end preparations.

B. Before welding, all pipe bevels shall be cleaned to bright metal so that all surfaces are smooth, uniform and free of fins, laminations, rust, scale, slag, grease, paint or other deleterious materials that would adversely affect weld quality.

C. All dirt, loose rust, and other foreign matter shall be cleaned from the interior of the pipe prior to positioning for welding.

D. Longitudinal seams on DSAW or ERW pipe shall be positioned on the upper surface of the line 30 degrees of top center. The seams in successive joints shall be offset a minimum of 15 degrees.

E. Line up clamps shall be used to assure proper alignment of joints. Tack welds during alignment shall be ground out before closure of root pass is complete.

F. Each arc burn shall be removed by cutting out a cylinder of pipe containing the arc burn or, at OWNER option, repaired by grinding. Grinding shall remove the metallurgical notch associated with the arc burn and shall leave a smooth contour on the pipe. After grinding, magnetic particle inspect and etch with ammonium persulfate to assure removal of heat-affected zone (HAZ). The grinding depth shall not exceed the corrosion allowance of the pipe wall as determined with a D-meter.

G. CONTRACTOR shall take any necessary precautions to prevent arc burns between the ground clamp and the work material. The ground lead shall not be welded directly to the pipe, fittings or related equipment. All such stray welds shall be considered arc burns.

H. Should lamination or split ends be discovered in the pipe during the process of welding, the full joint containing such defect shall be removed from the line and shall not be used again in the construction of the line.

I. If the ends of the pipe are damaged to the extent that a satisfactory welding contact cannot be obtained, pipe shall be cut and rebeveled to standard thirty-seven and one-half degrees (37 1/2®) with an approved beveling machine.

J. For pipes of the same nominal bore, the offset between the surfaces of abutted pipe ends shall not exceed 1/16 inch prior to welding.

K. For pipes of different nominal bore and the same outside diameter, the smaller bore shall be machined, ground or filed to give the above mentioned alignment with a taper not to exceed 1 in 4. Alternately a transition piece may be inserted which meets the same requirements.

L. No welding shall be performed when OWNER's Representative determines that the weld quality may be adversely affected by the weather conditions such as rain or high winds.

3.7.6 WELD REPAIR

A. Repair of weld defects or fault workmanship shall be in accordance with the approved WPS and shall be at CONTRACTOR's expense.

B. Defects, except cracks, in weld deposits may be repaired with the authorization of OWNER's Representative. Cracks are to be cut out and removed. Removal of defects for repair may be by any method that produces a clean, uncontaminated surface for installation of the repair weld. Chipping and oxygen-acetylene gouging are not permitted. All areas affected by air carbon arc gouging shall be power disk ground or grit blasted to remove all traces of residual carbon.

C. Any repaired weld shall be re-inspected by the same method that resulted in the initial failure.

D. Any pipe joint that has a weld that is still unacceptable after one (1) repair shall be rejected and the weld shall be removed at CONTRACTOR's expense.

3.7.7 INSPECTION AND TESTING

OWNER's Representative shall have access to the work area at all times and shall be informed by CONTRACTOR of required inspections or tests twenty-four hours prior to initiation of such inspection or test. Any test performed in the absence of OWNER's Representative shall be subject to retest at CONTRACTOR's expense.

3.7.8 RADIOGRAPHIC INSPECTION

A. All pipeline welds shall be x-ray inspected in accordance with the requirements of API STD 1104. Final authority to accept or reject welds based on x-ray results will be by OWNER's Weld Inspector. CONTRACTOR shall provide x-ray inspection by a independent third party testing company acceptable to the OWNER.

B. CONTRACTOR shall provide OWNER's Weld Inspector access to the work site and assist as needed when requested by OWNER's Representative.

C. The Inspector shall report the results of x-rays to OWNER's Representative and CONTRACTOR.

D. CONTRACTOR shall report the results of the previous days welding to OWNER's Representative. The report shall include the total number of welds completed, the number of x-rays inspected, the number of welds passed, the number of welds rejected by x-ray and visual inspection, and the resolution of each rejected weld.

3.8 FIELD-APPLIED PIPELINE COATING SYSTEMS

This specification covers the materials, surface preparation, priming, field application, inspection, and repair of corrosion coatings of buried or submerged pipelines, field joints, pipe, fittings, and mainline valves. Coating of above ground pipe is also covered by this specification.

Coating systems described by this Specification include:

Coatings of Field Joints and Weld Areas (Section 3.8.2)

Coating Fittings and Valves - Below Ground Service (Section 3.8.3)

Coating Pipe, Fittings, and Valves - Above Ground Service (Section 3.8.4)

3.8.1 CONTRACTOR RESPONSIBILITY

A. CONTRACTOR shall furnish the necessary material, labor and equipment to coat the field joints and fittings, repair damaged coating, or paint above ground pipe with the type of coating specified in the Part 2 Products or the Project Drawings and Scope of Work.

B. CONTRACTOR shall be responsible for providing personnel properly trained and proficient in applying the coating as specified or approved by OWNER. Where CONTRACTOR's personnel have, in the opinion of OWNER's Representative, a lack of training or skill, CONTRACTOR shall take immediate remedial action to provide coating application satisfactory to OWNER.

C. CONTRACTOR shall exercise care in handling the coated pipe and shall take precautionary measures to prevent damage to the coating. Should the coating become damaged as the result of handling or bending to the extent that the coating loses its bond to the pipe, CONTRACTOR shall repair or replace the coating to the satisfaction of OWNER's Representative.

D. Minor damage done to pipeline and field joint coating may be repaired by patching.

3.8.2 COATING OF FIELD JOINTS AND WELD AREAS

Heat Shrink Sleeve Specifications - The Specification for applying heat shrink sleeves between joints of mill coated pipe is as follows: (All materials furnished by CONTRACTOR).

Acceptable Materials:

Raychem WPCT and/or CANUSA Heat Shrink Sleeves for field joints. Length of sleeve to allow for a 2-inch minimum overlap on adjacent pipe coating.

Raychem Dirax Heat Shrink Sleeves for bored crossings.

The manufacturer’s recommended procedure shall be used to install the Raychem Heat Shrink Sleeves. A copy of the procedure shall be furnished to OWNER’s Representative prior to beginning work.

3.8.3 COATING FITTINGS AND VALVES - BELOW GROUND SERVICE

Coal Tar Epoxy System - All headers, mainline valves, and hot bends which are not furnished coated shall be blasted, brush coated, or spray coated using Coal Tar Epoxy with primer.

Acceptable Material: Carboline Carbo mastic 14 two part high build epoxy coal tar or equal.

Surface Preparation: SSPC-SP6 Commercial blast to provide 1.0 to 2.0 mil anchor profile.

Prime Coat: No Prime Coat.

Intermediate Coat: One coat Carbomastic 14 high build epoxy coal tar applied to a dry film thickness of 10 to 12 mils.

Finish Coat: One coat Carbomastic 14 high build epoxy coal tar applied to a dry film thickness of 10 to 12 mils. Total dry film thickness shall not be less than 20 mils after application of both coats.

Application: Shall be done in accordance with Manufacturer's Standard Application Instructions.

3.8.4 COATING PIPE, FITTINGS AND VALVES - ABOVE GROUND SERVICE

Exterior Paint System for all structural steel surfaces, production packages, metal buildings, process equipment and piping, ambient temperature to 200 Degrees F, unless noted otherwise.

Surface Preparation: SSPC-SP6 Commercial blast to provide 1.0 to 2.0 mil anchor profile.

Prime Coat: None

Intermediate Coat: One coat high solids polyamide epoxy applied to a dry film thickness of 4.0 to 6.0 mils.

Finish Coat: One coat high solids polyamide epoxy applied to a dry film thickness of 4.0 to 6.0.

Application: Shall be done in accordance with Manufacturer's Standard Application Instructions.

3.8.5 HOLIDAY DETECTORS

A. CONTRACTOR shall furnish, maintain and operate a high voltage holiday detector of a type acceptable to OWNER and shall check all base coating immediately prior to lowering the pipe into the trench. CONTRACTOR shall furnish OWNER's Representative a certification from the manufacturer of the holiday detector or from a testing agency acceptable to OWNER that the units have been properly adjusted and the voltage set within that range which is necessary for the detection of the holidays in the type coating applied in accordance with the above Specifications. The adjusting mechanism shall be sealed. CONTRACTOR shall repair all holidays and damaged spots located.

B. OWNER reserves the right to conduct pipeline defect surveys (Pipe Camp) at any time during construction in order to insure coating integrity. Any defects discovered shall be corrected at the sole expense of CONTRACTOR, including excavation and backfill if required.

3.8.6 INSPECTION OF COATED LINE PIPE

Coated pipe shall be handled at all times with wide nonabrasive canvas or leather belts, or other equipment, as may be subject to approval by OWNER's Representative, designed to prevent damage to the coating. Prior to lowering the pipe in the trench, an inspection of the entire finished coating shall be made visually and with a full-encirclement type electrode holiday detector, furnished by CONTRACTOR. Any defects in the coating shall be repaired prior to the placing of the pipe in the trench. Defects in the coating shall be repaired using the methods stated for repairs to mill coatings and field joint coatings. Heat-applied epoxy sticks, heat-applied tape coating, and heat-applied shrink sleeves are typically used for repairs to pipe coating.

3.8.7 INSPECTION OF FIELD JOINTS

The installed coating shall be inspected both visually and electrically to ensure that it is correctly installed and free from harmful defects. All repairs or replacements shall be at CONTRACTOR's expense and the need for such repair or replacement shall be determined by OWNER's Representative.

A. Electrical: The applied coating shall be electrically inspected with a full-encirclement type electrode holiday detector.

Where coating faults or holidays are randomly detected throughout the applied coating, the entire field joint shall be recoated, as determined by OWNER's Representative.

Where coating faults or holidays are minor, as determined by OWNER's Representative, the defective areas shall be repaired as specified.

B. Visual: The applied coating shall be visually inspected by CONTRACTOR to determine that all surfaces have been covered and that there are no air pockets, unsmoothed wrinkles, tears or other harmful defects.

3.8.8 REPAIR OF HEAT SHRINK SLEEVES

A. Repair of defects or holidays as permitted by this Specification, shall be in accordance with the coating manufacturer's recommended procedures subject to modification by this Specification or as required by OWNER's Representative. OWNER's Representative may at any time have a field joint recoated if the number of repairable defects or holidays, in his judgment, would render repairing of the coating unacceptable. The coating wrapper shall be removed and replaced if the wrapper splits or tears for a length exceeding 1 inch across the greatest dimension of the defect. The coating shall also be removed and replaced if the polyethylene material is melted, burned or charred to the extent of exposing the adhesive sealant over an area exceeding 1 inch across the greatest dimension of the defect. When a defective coating is removed, it is not necessary to remove the sealant material that adheres to the pipe.

B. If a blister or bubble is firm to the touch, no repair is required.

C. Repairable holidays, blisters, splits, tears, or burns shall be repaired using a minimum 6 inch square patch cut from a spare shrink sleeve. The patch shall extend a minimum of 2 inches beyond the damaged area. The patch shall be held over the defect and heated to seal the repair.

D. All repairs shall be visually and electrically inspected.

3.8.9 REPAIR OF THIN FILM COATING

A. Repair of defects or holidays as permitted by the Specification, shall be in accordance with the coating manufacturer's recommended procedures subject to modification by this Specification or as required by OWNER's Representative. OWNER's Representative may at any time have a field joint recoated if the number of repairable defects or holidays, in his judgment, would render repairing of the coating unacceptable.

B. Surface to be repaired shall be cleaned using a file turned on edge or other OWNER-approved methods. Care is to be taken to avoid excessive removal of sound coating. Holidays exhibiting damage to the coating over an area less than 1 inch across the greatest dimension of the defect or damage shall be repaired using hot patch melt sticks (supplied by CONTRACTOR) in accordance with the manufacturer's recommended procedures. Holidays exhibiting damage to the coating over an area exceeding 1 inch across the greatest dimension shall be repaired using shrink sleeves or hot applied coal tar tape (both supplied by CONTRACTOR) as directed by OWNER's Representative. All repair areas shall be visually and electrically inspected prior to final acceptance of the work.

3.8.10 ROCKSHIELD APPLICATION

Areas, designated by OWNER's Representative, which warrant protection from rock excavation shall be protected by rockshield material. Rockshield material shall be furnished by CONTRACTOR. Application of the rockshield shall be the responsibility of CONTRACTOR. Rockshield shall be applied as designated on the construction drawings or will be applied as required during field construction. Rockshield material shall be Ametek "Rock Guard" 3/8-inch thick or OWNER-approved equal.

3.9 LOWER IN

A. The trench shall be cleared of clods, skids, and other debris that might be detrimental to the coating immediately before the pipeline is lowered. Where the trench is excavated in gravel or similar materials, it shall be padded sufficiently and adequately with earth to form a cushion on the bottom of the trench before the pipeline is lowered.

B. All equipment used in handling or cradling coated pipelines shall be of a type which will not damage the coating. Equipment selected by CONTRACTOR must be acceptable to OWNER. CONTRACTOR shall provide adequate equipment to lower pipe properly into the trench. Pipe will be picked up without dragging, sliding, or bouncing off the added skids. The pipe will be lowered into the trench without rubbing the top or sides of the trench.

C. Pipelines shall be lowered into the trench without unnecessary strain and shall rest evenly on the bottom of the trench or on foundation after it is lowered. Any pipeline not carefully lowered into the trench shall be inspected for damaged coating. All damage shall be repaired by CONTRACTOR.

D. After lowering, the pipeline shall be made secure to prevent it from floating should water enter the trench. CONTRACTOR shall backfill the trench immediately after lowering at locations where the trench is likely to fill with water and cause the pipe to float, and ends of sections being lowered shall be capped to prevent water, dirt, or other foreign matter from entering the pipeline.

E. Completed sections of welded pipeline shall be lowered into the trench with sufficient slack to the line to provide for any contraction that may be caused by changes in temperature.

F. All sag bends shall be installed in the trench resting firmly and evenly on the bottom of the trench.

All overbends shall be installed with sufficient slack in the line to provide for any settlement of the line. The segment containing the overbend will be installed with 1 to 3 inches between the bottom of the pipe and the bottom of the trench.

G. The tie-in of the various sections shall be conducted in such a manner that short joints of pipe resulting therefrom may be utilized as they become available and so that the short joints are evenly dispersed throughout the facility.

H. Sections of pipe extending beneath highways, roads, or railroads, and any section of pipe where, in the opinion of OWNER, a failure in the pipe welds or connections would be dangerous to the public or would be difficult and expensive to repair after installation, will, at the option of OWNER's Representative, be pressure tested prior to installation. Such sections shall be sealed and tested at a pressure determined by OWNER's Representative and all welds and connections shall be inspected during the test. Defects found during this test shall be repaired by CONTRACTOR, and the sections shall be tested again until a satisfactory test is secured. This preliminary test will in no way relieve CONTRACTOR from testing these sections again in the final test.

I. Test Leads and Anodes - CONTRACTOR shall install test leads and anodes in accordance with drawings and at all crossings of existing pipelines, unless otherwise directed by OWNER's Representative.

3.10 BACKFILL

A. Before backfilling, the pipeline shall be inspected to make sure that it lies evenly on the bottom of the trench and that no skids, brush, rocks, stumps, or other debris are in the trench; and no such materials or debris shall be backfilled into the trench. Backfilling shall be conducted so that the trench shall be neatly backfilled and all of the excavated materials shall either be placed in the trench or bermed over it.

B. Rock, gravel, boulders, or like materials shall not be used as backfill material. Where such materials are encountered, CONTRACTOR shall haul a sufficient amount of earth or sand and place it around and over the pipeline to form a protective padding or cushion between it and such materials. If in the opinion of OWNER's Representative the supply and transportation of a sufficient amount of sand or earth by CONTRACTOR to cushion the pipe is not feasible, OWNER will allow rockshield to be used. CONTRACTOR shall supply and install to reduce the amount of earth or sand required. A minimum envelope of one foot of compacted clean dirt or sand shall be used to backfill around the pipeline when rockshield is installed.

C. All backfill shall be compacted to minimize settlement. Where certain soil conditions are encountered and where in the opinion of OWNER's Representative it is necessary, CONTRACTOR shall backfill the earth materials into the trench in layers.

D. CONTRACTOR shall install pipeline warning markers along the pipeline route where they are required by OWNER's Representative. Installation locations shall include at a minimum each side of each public road, highway, railroad, and waterway which is crossed, at each fence line and property line, at valves and test stations, and at other locations to provide adequate line of sight identification of the pipeline route as directed by OWNER's Representative. OWNER will furnish markers.

3.11 TESTING, TESTING EQUIPMENT, AND TESTING MATERIALS

A. CONTRACTOR shall furnish the necessary labor and equipment and perform all excavating, welding, fabricating, backfilling, and all other work required to conduct the internal cleaning and testing of the facilities as specified.

Where certain conditions are encountered and OWNER's Representative deems it necessary, CONTRACTOR shall test the pipeline in sections.

B. CONTRACTOR shall run pig or series of pigs equipped with sizing plates through the entire pipeline after all sections are welded together. Sizing plate shall be aluminum and shall have an outside diameter of 1 inch less than pipeline inside diameter.

C. CONTRACTOR shall furnish and run cleaning pigs using compressed air through the pipeline to remove loose dirt, scale and weld materials. Should the internal cleaning pig become lodged in the line due to CONTRACTOR's negligence in keeping the line free of foreign matter, CONTRACTOR shall, at its sole expense, locate and remove the cleaning pig. If the cleaning pig becomes lodged or damaged due to faulty material furnished by OWNER, the cost of locating and removing the cleaning pig and connecting the line shall be borne by OWNER.

D. The pipeline shall be cleaned by running multiple combinations of brush and swab pigs with air, such that all mill scale, dirt, dust, water, and other solid or liquid materials are removed from the pipe.

E. Proper cleaning shall be achieved when a swab pig removes no visible dust or particular matter from the pipeline.

F. Once the pipeline has been properly cleaned, the air shall be displaced from the pipeline by running a sphere, squeegee or foam pig with nitrogen. The pipeline shall then be pressurized with nitrogen to the required test pressure. CONTRACTOR shall provide nitrogen.

G. Each test section shall be pressurized for a minimum period of twenty-four (24) hours for the purpose of temperature stabilization. During this period all fittings and connections will be tested for leaks and corrected if necessary. CONTRACTOR shall cover as much of the pipeline as is practical before beginning the stabilization period.

H. After the stabilization period, the pressure shall be increased to the specified test pressure and maintained for a minimum period of twenty-four (24) consecutive hours. The pressure must be maintained above the minimum specific test pressures and cannot exceed the maximum pressures indicated. The minimum test pressure is 400 psig and the maximum test pressure is 450 psig unless otherwise specified in the Scope of Work or Project Drawings.

I. Deadweight readings shall be recorded every fifteen (15) minutes and temperature readings recorded every thirty (30) minutes during the test.

J. Should a significant drop in pressure occur during the test period which cannot be attributed to changes in temperature, CONTRACTOR shall locate and repair the leak(s). After repairs have been made, the test shall be repeated until it has been determined acceptable.

K. The pipeline pressure and temperature for the pressure test shall be continuously recorded with recording instruments. The pressure recording shall serve only as information data and shall not be used to determine pressure drop for pipeline leakage. No pipeline shall be judged acceptable until a continuous pressure test is maintained for the minimum test period and is recorded without pressure loss or gain unless correlated to temperature change. All data and charts shall be clearly marked with the date and time started, date and time completed, description of test section, type of test and shall be signed by CONTRACTOR and OWNER's Representative.

L. The minimum instrumentation for each test segment of line is as follows:

Deadweight Gauge - One - with weights calibrated to measure direct to 0.5 psi. Current calibration certificates from recognized standards shall be furnished for all dead weight gauges.

Pressure Recorders - One - range approximately 50% higher than test pressure. All pressure recorders and gauges shall be calibrated against dead weight gauges at the beginning of each test.

Static Pressure Gauge - Two - range approximately 50% higher than test pressure. All pressure recorders and gauges shall be calibrated against dead weight gauges at the beginning of each test.

Temperature Recorder - One - range 0-150®F.

Temperature Gauge - Two - Range 0-150®F, the sensing unit to be installed against bare metal.

3.12 FABRICATION, STATION, TIE-IN INSTALLATION, MAINLINE VALVES AND OTHER APPURTENANCES

A. With reference to the drawings, this item includes, without limitation, the installation of all facilities. CONTRACTOR shall furnish the labor and equipment and perform all work necessary to complete the installations in accordance with the drawings, Scope of Work and the applicable portion of any other

sections of these Specifications and as further set forth herein. All piping assemblies shall be fabricated from pipe and fittings furnished by OWNER or CONTRACTOR specifically for the project.

B. If specified, CONTRACTOR shall fabricate and pressure test certain sections of the pipeline and have them ready at the tie-in site for installation in the existing line when the line is shutdown by OWNER.

Prior to the fabrication of such sections, CONTRACTOR shall determine the exact elevation of the existing pipeline on each side of the proposed installation. CONTRACTOR shall utilize cold bends, if necessary, to complete the fabrication of such a section. Such sections, when installed, shall be in alignment with the existing line. All valves which are a part of the new section of pipeline shall be installed plumb and level. In the event it is necessary for CONTRACTOR to bend pipe for the fabrication, CONTRACTOR shall remove whatever additional amount of existing pipeline is necessary to allow for the increased length of the fabrication.

C. CONTRACTOR shall perform all work related to tie-ins to the existing gas facilities including but not limited to hot taps and welding on pressurized gas pipelines. CONTRACTOR shall obtain the approval of OWNER for all methods, equipment, construction techniques and scheduling related to work on the existing gas pipelines.

All hot taps shall be performed using T.D. Williamson fittings and equipment. All work shall be performed by experienced personnel who have received recent documented manufacturer training in the type of work to be performed. CONTRACTOR shall provide written documentation of qualification with T.D. Williamson Hot Tap equipment. If in the opinion of OWNER the evidence of qualification is insufficient to complete the required work, CONTRACTOR shall be required to obtain, at CONTRACTOR's expense, the services of MTD Services to perform the required hot tap work.

D. All piping and fittings installed under this item shall be tested in accordance with these Specifications, the Scope of Work, and at the pressure set forth in the specific drawings.

E. CONTRACTOR shall repair or replace any damaged coating on existing pipelines and shall mechanically clean, prime, and coat all underground piping and fittings with the materials specified in accordance with Pipe Protective Coating section of these Specifications.

3.13 CATHODIC PROTECTION

A. Test Leads - CONTRACTOR shall provide and install test leads in accordance with drawings at all crossings of existing pipelines, all PI's, and both ends of the pipeline unless otherwise directed by OWNER's Representative. Where feasible, as determined by OWNER's Representative, the test leads shall be located at existing fence rows, property lines, valve locations or other locations determined to be favorable for future use by OWNER. Test Leads shall be installed as directed by OWNER's Representative. Test leads shall be terminated above ground in as directed by OWNER, normally in a valve jacket or marker post.

B. Anodes - CONTRACTOR shall install anodes as directed by OWNER's Representative. The exact location shall be determined by OWNER's Representative. Each typical anode installation shall include a minimum of four (4) 9# anodes, installed at a minimum depth of ten (10) feet from the existing ground level. Anodes and Test Stations will be furnished by CONTRACTOR

C. Testing - All units shall be complete, assembled, wired, tested, and ready for operation as approved by OWNER's Representative. **HOME**