

PROCESS PIPING – GASEOUS OXYGEN

1. GENERAL

1.1 Scope

- .1 This Section covers the supply, installation, testing, cleaning and placing into operation of all GOX piping systems including fittings.

1.2 References

- .1 The following is a list of standards which may be referenced in this Section and any supplemental Data Sheets:
 - .1 ANSI:
 - .1 B16.5, Pipe Flanges and Flanged Fittings
 - .2 B16.11, Forged Fittings, Socket-Welding and Threaded
 - .3 B16.21, Nonmetallic Flat Gaskets for Pipe Flanges
 - .2 ASTM:
 - .1 A182/A182M, Standard Specification for Forged or Rolled Alloy-Steel Pipe Flanges, Forged Fittings, and Valves and Parts for High-Temperature Service
 - .2 A193/A193M, Standard Specification for Alloy-Steel and Stainless Steel Bolting Materials for High-Temperature Service
 - .3 A312/A312M, Standard Specification for Seamless and Welded Austenitic Stainless Steel Pipes
 - .4 A380, Standard Practice for Cleaning, Descaling, and Passivation of Stainless Steel Parts, Equipment, and Systems

1.3 Design Requirements

- .1 Where pipe diameter, thickness, pressure class, pressure rating, or thrust restraint is not shown or specified, design piping system in accordance with the following:
 - .1 Process Piping: ASME B31.3
 - .2 Provincial Regulations

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1.4 Submittals

- .1 General:
 - .1 Provide process piping submittals for GOX piping
- .2 Shop Drawings:
 - .1 Shop Fabricated Piping:
 - .1 For stainless steel piping, sizes 50 mm and larger, provide detailed pipe fabrication or spool drawings showing fittings and bends, dimensions, field weld locations, coatings, hydrotest information and other pertinent information.
 - .2 For shop fabricated piping that connects to existing flanges and nozzles, measure and show on the shop drawings the as-built information for the existing flange centrelines, flange faces and any angular misalignment. Adjust design of new piping accordingly so that new piping accurately mates with existing piping.
 - .2 Dissimilar Buried Pipe Joints: joint types and assembly drawings.
- .3 Quality Control Submittals:
 - .1 Certificate of Satisfactory Installation, Form 102, as per Section 01650 – Equipment Installation.
 - .2 Laboratory Testing Equipment: certified calibrations, Manufacturer's product data, and test procedures.
 - .3 Nondestructive inspection and testing procedures.
 - .4 Manufacturer's Certification of Compliance:
 - .1 Pipe and fittings.
 - .2 Factory applied resins and coatings.
 - .5 Test logs.
 - .6 Procedures pickling and passivation of stainless steel piping.
 - .7 Welding procedures and welder qualifications.

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1.5 Delivery, Storage, and Handling

- .1 General:
 - .1 Flanges: securely attach metal, hardboard, or wood protectors over entire gasket surface.
 - .2 Threaded or Socket Welding Ends: fit with metal, wood, or plastic plugs or caps.
 - .3 Handling: use heavy canvas or nylon slings to lift pipe and fittings.

1.6 Measurement and Payment

- .1 No measurement will be made for GOX piping. GOX piping will be paid for on a lump sum basis at the Contract Unit Price for “GOX Piping”.

2. PRODUCTS

2.1 Piping

- .1 As specified in Sections 15200-09 – Data Sheet – Stainless Steel Pipe Fittings – Special Service 1, and 15200-00S – Piping Schedule located at the end of this Section as Supplement.
- .2 Diameters Shown:
 - .1 Standardized Products: nominal size.

2.2 Fabrication

- .1 Mark each pipe length on outside:
 - .1 Size or diameter and class
 - .2 Manufacturer's identification and pipe serial number
 - .3 Location number on laying drawing
 - .4 Date of manufacture
- .2 Code markings according to approved Shop Drawings.
- .3 Flanged pipe shall be fabricated in the shop, not in the field, and delivered to the Site with flanges in place and properly faced.

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3. EXECUTION

3.1 Examination

- .1 Verify size, material, joint types, elevation, horizontal location, and pipe service of existing piping to be connected to new piping or new equipment.
- .2 When connecting to existing flanges and nozzles, accurately measure pipe/flange locations and any angular misalignment and make appropriate adjustments so that new piping will mate up properly.
- .3 Inspect size and location of structure penetrations to verify adequacy of wall pipes, sleeves, and other openings.
- .4 Welding Electrodes: verify proper grade and type, free of moisture and dampness, and coating is undamaged.

3.2 Preparation

- .1 Notify Contract Administrator at least two (2) weeks prior to field fabrication of pipe or fittings.
- .2 Inspect pipe and fittings before installation, clean ends thoroughly, and remove foreign matter and dirt from inside.

3.3 Installation-General

- .1 Remove foreign objects prior to assembly and installation.
- .2 Flanged Joints:
 - .1 Install perpendicular to pipe centreline.
 - .2 Bolt Holes: straddle vertical centrelines, aligned with connecting equipment flanges or as shown.
 - .3 Use torque-limiting wrenches to ensure uniform bearing and proper bolt tightness.
 - .4 Raised-Face Flanges: use flat-face flange when joining with flat-faced ductile or cast iron flange.
- .3 All bolt threads shall be coated with an anti-seize compound prior to being made up with nuts unless otherwise specified in the detail piping system specifications. Do not contaminate piping with anti-seize compound.

3.4 Installation-Buried Pipe

- .1 Placement:
 - .1 Keep trench dry until pipe laying and joining are completed.

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- .2 Pipe base material will be supplied and installed by the Contractor.
- .3 Exercise care when lowering pipe into trench to prevent twisting or damage to pipe.
- .4 Measure for grade at pipe invert, not at top of pipe.
- .5 Excavate trench bottom and sides of ample dimensions to permit visual inspection and testing of piping.
- .6 Prevent foreign material from entering pipe during placement.
- .7 Prevent uplift and floating of pipe prior to backfilling.
- .2 Tolerances:
 - .1 Deflection from Horizontal Line: maximum 2 mm.
 - .2 Deflection From Vertical Grade: maximum 6 mm.
 - .3 Joint Deflection: maximum of 75% of Manufacturer's recommendation.
 - .4 Horizontal position of pipe centreline on alignment around curves maximum variation of 500 mm from position shown.
 - .5 Pipe Cover: minimum 2700 mm, unless otherwise shown.
- .3 Risers:
 - .1 Construct risers as shown on the drawings.
- .4 Installation in a Conduit:
 - .1 Install pipe in conduit where shown on the Drawings. Casing spacers as specified in Section 02511 – Watermains. Supply and install PVC SDR 35 conduit as specified in Section 02530 – Sanitary Sewers.

3.5 Pickling and Passivation

- .1 All stainless steel piping shall be cleaned and passivated in accordance with ASTM A380. This shall include but not be limited to the following:
 - .1 Degreasing to remove oil and grease films,
 - .2 Pickling to chemically clean the surface,
 - .3 Passivating with nitric acid to form an oxide file,
 - .4 Testing to ensure successful treatment.

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- .2 All GOX piping that is supplied as passivated by the Contractor or by the City and that is subsequently welded during the performance of the Work shall be re-pickled and re-passivated (internally) in accordance with 3.5.1.

3.6 Cleaning

- .1 Clean all oxygen piping, including vents and drains, in accordance with Compressed Gas Association Pamphlet 4.1.
- .2 Prevent accumulation of weld rod, weld spatter, pipe cuttings and filings, gravel, cleaning rags, and other foreign material within piping during fabrication and assembly.
- .3 Examine piping to assure removal of foreign objects prior to assembly.

3.7 Testing

- .1 General:
 - .1 Conduct pneumatic pressure tests on newly installed piping, as indicated in Section 15200-00S – Piping Schedule.
 - .2 Supply and Install necessary equipment and material and make taps in pipe, as required. Provide blind flanges as required.
 - .3 Contract Administrator will monitor the tests. Provide advance notice of start of testing.
 - .4 Test Pressures: As specified.
 - .5 Test Records: make records of each piping system installation during the test to document the following:
 - .1 Date of test
 - .2 Description and identification of piping tested
 - .3 Test fluid
 - .4 Test pressure
 - .5 Remarks, including:
 - .1 Leaks (type, location)
 - .2 Repairs made on leaks
 - .6 Certification by Contractor and signed acknowledgment by Contract Administrator that tests have been satisfactorily completed.

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- .2 Testing New Pipe Connected to Existing Pipe: Contractor to test the complete GOX pipe line, including the pipe supplied under this contract and the GOX pipe supplied under Contract 742-2005 to ensure connection has no leaks. Coordinate with contract 742-2005.
- .3 Preparation and Execution:
 - .1 Buried Pressure Piping:
 - .1 Conduct tests twice, once before burial and final hydrostatic acceptance tests after trench has been completely backfilled.
 - .2 Expose joints for the acceptance test on buried pressure piping to be pneumatically tested or subjected to an initial service leak test.
 - .2 Exposed Piping: Conduct tests after piping has been completely installed including supports, hangers, and anchors, but prior to insulation. Conduct testing again after backfill is complete.
- .4 Pneumatic Leak Tests:
 - .1 Perform on GOX piping.
 - .2 Equipment: Supply and Install the following:

Amount	Description
1	Pneumatic compressor separator-dryer system capable of providing oil-free dry air and equipped with one or more full capacity safety relief valves set at a pressure of not more than 105% of the required primary test pressure
1	Calibrated test gauge

- .3 Procedure:
 - .1 Perform pneumatic testing using accurately calibrated instruments and oil-free, dry air.
 - .2 Perform tests only on exposed piping, after piping has been completely installed, including supports, hangers and anchors, and inspected for proper installation.
 - .3 Take necessary precautions to protect personnel from hazards associated with air testing.
 - .4 Prior to test, remove or suitably isolate appurtenant instruments or devices that could be damaged by test.

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- .5 Test piping system at the test pressure specified in Section 15200-00S – Piping Schedule, for four (4) hours. Piping shall be completely leak free.
- .6 Examine joints and connections for leakage with soap bubbles.
- .7 Correct leaks and retest to satisfaction of the Contract Administrator.
- .8 Following pneumatic testing, thoroughly purge with nitrogen all GOX pipes.

3.8 Field Quality Control

- .1 Minimum Duties of Welding Inspector:
 - .1 Job material verification and storage.
 - .2 Qualification of welders.
 - .3 Certify conformance with approved welding procedures.
 - .4 Maintenance of records and preparation of reports in a timely manner.
 - .5 Notification to Contract Administrator of unsatisfactory weld performance within twenty four (24) hours of weld test failure.

3.9 Supplements

- .1 Section 15200-00S – Piping Schedule.
- .2 Data Sheets.

Number	Title
15200-09	Stainless Steel Pipe and Fittings – Special Service 1

END OF SECTION

Service	Commodity Abbreviation	Nominal Size(s) (mm)	Exposure	Piping Material	Specification Section	Test Type and Pressure (kPa) ¹	Remarks
Gaseous Oxygen	GOX	50	Exposed and burried	Stainless Steel	15200-09	P, 800	

Notes

¹ P = Pneumatic

DATA SHEET – STAINLESS STEEL PIPE AND FITTINGS-SPECIAL SERVICE 1

Item	Size	Description
Pipe	All 50 mm	ASTM A312/312M Type 316 welded annealed, pickled and passivated. Use Type 316L for welded joints. Schedule 40S.
Pipe Joints	50 mm	Butt-welded or flanged at valves and equipment as required or shown.
Pipe Fittings	50 mm	Butt Welded: ASTM A403/A403M, Grade WP316L conforming to ANSI B16.9 and MSS SP 43, annealed, pickled and passivated; fitting wall thickness to match adjoining pipe; long radius elbows unless shown otherwise.
Pipe Branch Connections	50 mm	40 mm and smaller branch: Forged Sockolet or half coupling, 13800kPag WOG ASTM A182/A182M, Grade F316L.
Flanges	50 mm	Forged: ASTM A182/A182M Grade F316L, Class 150, welding neck, 1.5 mm raised face, ANSI B16.5 standard.
Bolting	All	Type 316, ASTM A193/A193M, Grade B8M hex head bolts and ASTM A194/A194M Grade 8M hex head nuts.
Gaskets	All Flanges	3.0 mm thick Gore-Tex flat ring type for raised face flanges and full face type for flat face flanges, Garlock, Chesterton.

Notes:

1. Refer to Section 15200-00A for special cleaning requirements for oxygen piping.

END OF SECTION

PROCESS VALVES AND OPERATORS

1. GENERAL

1.1 Work Included

- .1 Supply and installation of miscellaneous valves, 50 mm to 75 mm, in valve chambers.
- .2 Installation and testing of 750 mm butterfly valves and operators supplied under separate contract.

1.2 References

- .1 The following is a list of standards which may be referenced in this Section:
 - .1 ANSI:
 - .1 B16.1, Cast Iron Pipe Flanges and Flanged Fittings.
 - .2 ASTM:
 - .1 B62, Standard Specification for Composition Bronze or Ounce Metal Castings.
 - .3 AWWA:
 - .1 C500, Metal Seated Gate Valves for Water Supply Service.
 - .2 C504, Rubber Seated Butterfly Valves.
 - .3 C550, Protective Epoxy Interior Coatings for Valves and Hydrants.

1.3 Submittals

- .1 Identify process area in the title of all submittal transmittals.
- .2 Shop Drawings:
 - .1 Product data sheets for make and model.
 - .2 Complete catalog information, descriptive literature, specifications and identification of materials of construction.
- .3 Information Submittals:
 - .1 Certification of NSF 61B compliance.

1.4 Measurement and Payment

- .1 No measurement or payment will be made for the work in this section. Include costs in the unit prices bid for "Valve Chambers" as listed in the Schedule of Prices.

PROCESS VALVES AND OPERATORS

2. PRODUCTS

2.1 General

- .1 All valves to include operator, handwheel, and accessories for a complete operation.
- .2 Valve to be suitable for intended service. Renewable parts not to be of a lower quality than specified.
- .3 Valve same size as adjoining pipe.
- .4 Valve ends to suit adjacent piping.
- .5 Size operator to operate valve for the full range of pressures and velocities.
- .6 Valve to open by turning counterclockwise.
- .7 Provide lubricants of the type recommended by the equipment Manufacturer in sufficient quantity to fill all lubricant reservoirs and to replace all consumption during testing, start-up and operation prior to Substantial Performance. Lubrication systems and lubrications shall be certified to ANSI/NSF Standard 61, to be compatible with potable water use.

2.2 Materials

- .1 Brass and bronze valve components and accessories that have surfaces in contact with water to be alloys containing less than 16% zinc and 2% aluminum.
 - .1 Bronze material shall conform to ASTM B62.

2.3 Valves

- .1 Gate Valves:
 - .1 Small diameter threaded gate valves (75 mm diameter and less) shall be all cast bronze, solid wedge disk, rising stem c/w hand wheel rated for minimum 1.0 MPa non-shock cold water service. Direction of opening shall be counter clockwise and shall be indicated on the hand wheel.
 - .2 Acceptable product; Crane, Jenkins, Kennedy, Mueller, or approved equal.

3. EXECUTION

3.1 Installation by Contractor

- .1 Flange Ends:
 - .1 Flanged valve boltholes shall straddle vertical centerline of pipe.
 - .2 Clean flanged faces, insert gasket and bolts, and tighten nuts progressively and uniformly.

PROCESS VALVES AND OPERATORS

- .2 Screwed Ends:
 - .1 Clean threads by wire brushing or swabbing.
 - .2 Apply joint compound.
- .3 Valve Orientation:
 - .1 Orient butterfly valve shaft so that unbalanced flows or eddies are equally divided to each half of the disc, i.e., shaft is in the plane of rotation of the eddy.

3.2 Field Finishing by Contractor

- .1 Equipment as specified in Section 02511 – Watermains.

3.3 Field Quality Control by Contractor

- .1 Performance Test: In accordance with operating conditions indicated in supplemental valve schedules sheets.
- .2 Valve may be either tested while testing pipelines, or as a separate step.
- .3 Test that valves open and close smoothly under operating pressure conditions. Test that two way valves open and close smoothly under operating pressure conditions from both directions.
- .4 Count and record number of turns to open and close valve; account for any discrepancies with Manufacturer's data.

3.4 Manufacturer's Representative Field Services

- .1 The valve(s) as listed below require Manufacturer's field services:
 - .1 750 mm Butterfly Valves
- .2 Verify satisfactory delivery of the equipment by completing Form 100, illustrated in Section 01650 – Equipment Installation.
- .3 Instruct Contractor in the methods and precautions to be followed in the installation of the equipment. Certify the Contractor's understanding by completing Form 101, illustrated in Section 01650 – Equipment Installation.
- .4 Arrange for a technically qualified Manufacturer's Representative to attend the installation work, certify correct installation, train operating and maintenance staff and undertake the testing of the system for sufficient periods, to ensure the equipment is installed, operated and maintained in accordance with the Manufacturer's recommended procedures.

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- .5 The minimum periods of Site attendance as total number of business days for all equipment are identified in the following table along with the form to be completed on each of these trips.
- .6 The total number of trips will depend on the Contractor's schedule. The cost of additional trips, to be determined by the Contract Administrator, will be borne by the Contractor. Arrange for a technically qualified Manufacturer's Representative to attend the installation work, certify correct installation, train operating and maintenance staff and undertake the testing of the system for sufficient periods, to ensure the equipment is installed, operated, and maintained in accordance with the Manufacturer's recommended procedures.

Item	Description	Total number of business days	Form
1	Certificate of Equipment Delivery	1	100
2	Certificate of Readiness to Install	2	101
3	Certificate of Satisfactory Installation	2	102
4	Certificate of Equipment Satisfactory Performance Testing	1	103

3.5 Installation Witnessing

- .1 The Contractor shall ensure that equipment is installed plumb, square and true within tolerances specified by the Manufacturer's Representative and as indicated in the Contract Documents.
- .2 The Manufacturer's Representative shall ensure the equipment is installed as required to provide satisfactory service.
- .3 The Manufacturer's Representative and the Contractor are to cooperate to fulfill the requirements for a successful installation as documented by Form 102, illustrated in Section 01650 – Equipment Installation.

3.6 Equipment Performance Testing

- .1 The Manufacturer's Representative shall ensure that each pump, including all component parts, operates as intended.
- .2 The Manufacturer's Representative shall demonstrate satisfaction of requirements specified herein.
- .3 The Manufacturer's Representative and the Contractor are to cooperate to fulfill the requirements for successful testing of the equipment as documented by Form 103, illustrated in Section 01650 – Equipment Installation.

END OF SECTION

SITE GAS DISTRIBUTION SYSTEM

1. GENERAL

1.1 Scope

- .1 Provide a new natural gas service downstream of the existing gas meter located at the north east corner of the Winnipeg WTP and run underground to the Bulk Chemical Storage and Standby Generator Buildings including:
 - .1 Piping, valves, and fittings.
 - .2 Excavation, backfill, and bedding.
 - .3 Supply and Install tracer wire with buried plastic piping.
 - .4 Physical protection of buried piping.
 - .5 Signage identifying underground gas service on City property. Locate signage at all railroad crossing points, alignment deflection points and every 30 m in boulevard areas.
 - .6 Supply and install steel sleeves under railway crossings.
 - .7 Design drawings and record (as-built) drawings.
- .2 Coordinate installation and routing of gas piping with Contract Administrator. Proposed gas pipe route across City property is shown on the Drawings.
- .3 Locate a service entry point above grade adjacent complete with a blind flange for each of the new Bulk Chemical Storage and Standby Generator Buildings as shown on the Drawings. Coordinate installation with Contract Administrator. Regulators for the Bulk Chemical Storage and Standby Generator Buildings are not in this contract.

1.2 Related Work

- .1 Fill Material

1.3 Utility Service Requirements

- .1 Peak flow capacity: 4,905 kW (16,736,000 Btu/hour)
- .2 Supply pressure: 69 kPa (10 psig).

1.4 References

- .1 National Standard of Canada CAN1-B149.1 (latest edition) installation Code for Natural Gas Burning Appliances and Equipment.
- .2 Manitoba Hydro Standards.
- .3 Drawing WH-C0100.

SITE GAS DISTRIBUTION SYSTEM

1.5 Measurement and Payment

- .1 No measurement will be made for natural gas piping. Natural gas piping will be paid for on a lump sum basis at the Contract Unit Price for "Natural Gas Piping".

2. PRODUCTS

2.1 Steel Pipe

- .1 Underground: PE coated steel pipe.
- .2 Above ground: Minimum Schedule 40 pipe.
- .3 PE coated steel piping manufactured to CSA Z245.1M. HDPE coating shall be to following schedule:

<u>Pipe Size (mm)</u>	<u>Thickness (μ)</u>
Up to 25	686
30	762
40	787
50 and Over	863

- .4 Jointing Methods:
 - .1 Threaded Fittings to ANSI Standard B16.3:
 - .1 For above ground use, Schedule 80 pipe.
 - .2 Threaded joints not allowed underground.
 - .2 Forged Steel Socket Weld ANSI Standard B16.11.
 - .3 Wrought Steel Butt Welding fitting CSA Z245.10.

2.2 PE Pipe

- .1 Pipe: to CSA B137.4.
- .2 Grade PE 2306 or 3406, Series 160.
- .3 Jointing Methods: Joint pipe according to Manufacturer's recommendations. Threading and gluing not permitted on polyethylene pipe.
 - .1 Socket fittings: to ASTM D2683.
 - .2 Butt fusion.

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- .3 Compression fitted joints: to ASTM D746 with internal tubular stiffener.
- .4 Use approved transition fittings when jointing polyethylene pipe to other pipe materials.

2.3 Valves

- .1 Conform to CGA Standard 3.16.
- .2 Steel plug type gas valve, (complete with cast iron curb box, cover and key).
- .3 Steel pressure lubricated plug type gas valve, (complete with cast iron curb box, cover and key).
- .4 Bronze plug-type gas valve, 900 kPa working pressure, complete with cast iron curb box, cover and key.

3. EXECUTION

3.1 Excavation

- .1 Excavate to the lines and grades as shown on the construction Drawings. Where no depths are indicated, install to the depths indicated below.
- .2 In roads, streets, driveways and parking areas, excavate depth of trench to provide 1200 mm of cover over pipe.
- .3 On private property, in open non-travelled areas, excavate depth of trench to provide 900 mm of cover over pipe.

3.2 Pipe Laying

- .1 Provide protective pipe sleeve under railroad crossings; sleeve diameter 50 mm greater than gas pipe diameter.
- .2 Lay pipe to specified alignment, to within tolerance of 200 mm.
- .3 Lay pipe on 50 mm cushion of compacted sand fill or flat, undisturbed trench bottom.
- .4 Lay PE pipe on 50 mm compacted sand fill or flat undisturbed trench bottom. Backfill around sides and to 50 mm on top of pipe with sand filled material and thoroughly tamp in place. Backfill with clay fill thoroughly tamped in place.
- .5 Provide recesses on trench bottom for couplings, fittings, and valves to ensure bearing will occur along barrel of pipe.
- .6 Prevent dirt from entering exposed ends of pipe.
- .7 Lay service line pipe on proper grade to drain from building to gas main.

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- .8 Lay gas pipe on properly graded trench bottom to prevent sags and low points in piping.
- .9 For steel pipe, wrap couplings and fittings with PE tape and heat shrink over pipe.
- .10 For PE pipe, provide tracer wire to aid in pipe location. Provide tracer wire test lugs at both ends.
- .11 Whenever pipe is to be deflected vertically or horizontally, do not exceed amount of deflection recommended by Manufacturer in order to maintain satisfactory piping.
- .12 Ensure minimum of 1000 mm between gas pipe and any underground structure that is parallel to gas pipe.
- .13 Ensure minimum of 100 mm between gas pipe and any underground structure that crosses gas pipe.

3.3 Valves and Valve Box

- .1 Locate valves as specified and shown on the Drawings.
- .2 Set valves on solid bearing. Set plumb and level.
- .3 Centre and plumb valve box over valve. Set box cover flush with finished ground surface. Prevent shock or stress from being transmitted through valve box to valve.
- .4 For steel valves and cast iron valve boxes, wrap valve and valve box with polyethylene tape and heat shrink; or paint valves and valve boxes with red anti-rust primer and one coat of epoxy paint.

3.4 Pressure and Leakage Tests

- .1 Coordinate pressure testing and holiday testing for witness by Contact Administrator. Allow for visual inspection prior to back fill.
- .2 Test Medium: air, natural gas or inert gas such as nitrogen.
- .3 Fill piping with test medium for 24 hours prior to actual test.
- .4 Subject pipe to 690 kPa (100 psi) maximum operating pressure for a minimum of 24 hours.
- .5 Supply pumps, connections, gauges, test gases and other necessary apparatus required for test.
- .6 Conduct holiday test prior to backfill.
- .7 Conduct pressure test after backfill. No pipe installation will be accepted if leaks are detected or if pressure at end of test is less than 95% of original test pressure.
- .8 Replace all material found to be defective.

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3.5 Purging

- .1 If air or inert gas was used for testing, purge lines with natural gas before using.

END OF SECTION