

**SECTION 22 62 13
NATURAL GAS SYSTEMS**

PART 1 – GENERAL

1.01 WORK INCLUDED

- A. General: Provide gas systems in accordance with the Contract Documents.

1.02 REFERENCE STANDARDS

- A. Comply with applicable provisions and recommendations of the following Codes:
1. International Plumbing Code – 2013
 2. Local Code and Amendments
 3. International Fuel Gas Code
- B. Provide gas systems in accordance with the intent of the Contract Documents. Install all gas services meter rigs, regulators, etc., in accordance with the provisions of gas serving company and obtain all necessary approvals.
- C. Make arrangements to provide gas service into the building. Ascertain what materials and/or labor will be provided by the local utility company and/or other City authority and pay any fee in conjunction therewith.
- D. Gas service contract limit line as indicated on the Drawings.

1.03 RELATED DOCUMENTS

- A. Section 22 05 01 – Plumbing General Provisions

PART 2 – PRODUCTS

2.01 BELOW GRADE PIPING AND FITTINGS

- A. Piping: Polyethylene piping, with heat fusion weld joints, Type II, ASTM D2513, ASTM D2683, ASTM D3261, PE 2406, where approved by local gas company standards.

1 inch NTS	SDR 12.5
1¼ inch NTS	SDR 13.9
1¼ inch IPS	SDR 10
2 inches IPS	SDR 11
3 inches IPS	SDR 11.5
4 inches IPS	SDR 11.5
6 inches IPS	SDR 11.5
8 inches IPS	SDR 11.5
10 inches IPS	SDR 11.5

- B. Transition Fittings: Steel to polyethylene pipe transition couplings and risers shall conform to ASTM D2513 & D2683 and ANSI B31.8 and DOT 192.121, ANSI B1.20, where applicable and meet design, material and construction standards of gas service company. Provide all accessories and fittings required for complete installation at building gas riser location available from Perfection Corporation, or Continental Industries.

- C. Tracer Wire: Single conductor with green coating and minimum size No. 12 AWG stranded copper.
- D. Buried Pipe Tape: 2 inches wide, safety yellow color code, heavy gauge 0.035-inch, detectable aluminum film including following text: "CAUTION Gas line buried below".
 - 1. Acceptable manufacturers/products include:
 - a. Seton Name Plate Company
 - b. EMED Co., Inc., Buffalo, New York
 - c. Enterprises, Inc., Waterloo, Michigan
 - d. "Magnetec" by Thor Enterprises, Inc., Waterloo, Michigan
- E. Underground at Service Entrance: Same as Above-ground covered with a flexible polymer film with coal tar and synthetic elastomeric coating of 36-mil thickness or extruded high-density polyethylene factory applied coating of 30 mil thickness. Wrap fittings with 10-mil polyethylene tape, ANSI A21.5, double layer, half-lapped. Minimum dielectric strength exceeding 12kV. Use compatible primer below polymer film or polyethylene tape.

2.02 ABOVE GRADE PIPING AND FITTING MATERIALS

- A. General Characteristics for Threaded Pipe and Fittings:
 - 1. Field Pipe Threading: Comply with National Fuel Gas Code "Table I Specifications for Threading Metallic Pipe" for length of threaded portion of pipe and number of threads to be cut.
 - 2. Pipe Pressure Fittings shall comply with ANSI/ASME B16.3. Bushing/Plugs shall comply with ANSI/ASME B16.14
 - 3. Metallic Pipe and Fittings Threads: Taper pipe threads complying with Standard for Pipe Threads, General Purpose, ANSI/ASME B1.20.1.
 - 4. Thread Compounds: Resistant to action of chemical constituents of gases to be conducted through piping systems and labeled by manufacturer accordingly.
- B. Above Grade Interior Piping: ASTM A106 Gr B, or A-53 B seamless, Schedule 40, carbon steel pipe.
- C. Above Grade Exterior Piping: ASTM A106 Gr B, or A-53 B seamless, Schedule 40, carbon steel pipe, hot dipped galvanized coating.
- D. Fittings:
 - 1. Pipe sizes 2½ inches and smaller:
 - a. Interior 150# black malleable iron threaded fittings.
 - b. Exterior 150# black malleable iron threaded fittings with hot dipped galvanized coating.
 - 2. Pipe Sizes 3 inches and larger:
 - a. Interior: Cast iron flanges, and vee-butt welded joints.
 - b. Exterior: Cast iron flanges, and vee-butt welded joints, primed coated and 2 coats of exterior grade paint.

3. Joints: Red or white lead and oil or approved pipe compound.

2.03 VALVES

- A. Lubricated Plug Valves: UL Listed valves, ASTM-A-126 Grade B steel body and plug material, suitable for natural gas service and pressures up to 200 psi, with close tolerance between the plug and body sealing surfaces, reinforced Teflon stem seal, leak-proof spring loaded ball and lubricant sealed check valve; and combination lubricant screw and button head fitting to prevent foreign matter from being forced into lubricant system. Valve plugs are to be floated on low-friction Teflon surfaces for extra ease of turning – the lower surface to also act as a means of minimizing torsional stress in the spring – and are to have port area equal to 100 percent of the area of standard pipe. Valves are to be so constructed that lubricant system has sufficient pressure to force lubricant over all seating surfaces. Extruded Lubricant around stem is to be positive indication that lubricant system is full, and that there had been a minimum contamination of line fluids. Lubricant shall be suitable for hydrocarbons, L.P.G. and natural gas. Similar to the following:
 1. Interior manual gas valves (½-inch to 2½-inch size): Threaded ends, lever actuation, and lever handle; “Series 601” by Homestead Valve Division of Olson Technologies.
 2. Interior manual gas valves (3-inch to 6-inch size): Flanged ends, lever actuation, and lever handle; “Series 602 and 622” by Homestead Valve Division of Olson Technologies.
 3. Exterior manual gas valves (3-inch to 6-inch size): Permanently lubricated plug valve, lever actuation, and lever handle; “Roots Style 350” by DMD/Dresser.
- B. Ball Valves (½-inch to 2-inch size): Bronze ball valve with B16 chrome plated brass ball and threaded ends; vinyl-coated steel handle; factory-tested under water with air pressure in open and closed positions. Listed by Underwriters Laboratories as natural gas shut-off valve and labeled accordingly; “Series 80-100” by Apollo.
- C. Check Valves: Bronze swing check valve with soft resilient disc, suitable for natural gas service; “B-320BC, Class 125, threaded ends, with BUNA-N Disc” by Stockham.
- D. Earthquake Valve: Earthquake ball type actuated automatic gas shut off valve, listed by UL and Certified by California State Architect in accordance with ASCE 25-97, sized for minimum pressure drop of 0.1-inch water column at total connected gas load; “Koso/California Series 300” by Pacific Seismic Products.

2.04 PRESSURE REGULATING VALVES

- A. ¾-Inch Pipe Size:
 1. Lower Diaphragm Case: Die cast aluminum with an exclusive 7-step advance conversion coating, single coat polyester and High Polyurethane Top Coat
 2. Top Assembly: Die cast aluminum with an exclusive 7-step advanced conversion coating, single coat polyester primer and High Solid Polyurethane Top Coat
 3. Pressure Spring: Steel, zinc plated and yellow chromate treated. Color coded for identification
 4. Diaphragm Plate: Steel, plated
 5. Seat Disc: Buna-N
 6. Orifice: High strength, corrosion resistance, aluminum
 7. Lever: Stamped aluminum

8. Seal Plug: Ultraviolet stabilized, mineral filled nylon
 9. ¾-inch pipe size
 10. 5-inch w.c. to 7½-inch w.c. outlet pressure regulation
 11. Removable weather and bug-proof stainless steel screened ¾ inch NPT vent to resist freeze-ups and to exclude foreign matter
 12. Design Conditions: Inlet pressure 5 psi outlet pressure 7 inch w.c. with minimum capacity: 32 scfh
 13. "S-253" by Fisher; or "CR-4000-180" by American Meter
- B. 2-inch pipe size, flanged connections, spring color Green for 6 inch w.c. to 14-inch w.c. outlet pressure regulation, die cast aluminum alloy diaphragm case and cast iron body, diaphragm type regulator valve, internal control tube for pressure control, straight body with flow horizontal and vent outlet pointing downward. Provide regulator meeting following design conditions: inlet pressure 5 psi, outlet pressure 8 inch w.c. Capacity: 4241 scfh; "Model 122-12" by Equimeter.
- C. 2-inch pipe size, flanged connections, spring color Green for 6 inch w.c. to 14-inch w.c. outlet pressure regulation, die cast aluminum alloy diaphragm case and cast iron body, diaphragm type regulator valve, internal control tube for pressure control, straight body with flow horizontal and vent outlet pointing downward. Provide regulator meeting following design conditions: inlet pressure 1 psi, outlet pressure 14-inch w.c. Capacity: 7834 scfh; "Model 122-12" by Equimeter.
- D. 1½-inch pipe size, threaded connections, spring color Blue for 5 inch w.c. to 8½-inch w.c. outlet pressure regulation, diaphragm type regulator valve, straight body with internal relief vent. Inlet pressure 14 inches w.c., outlet pressure 8 inches w.c. Capacity: 634 scfh; "Model 243-12 -1" by Equimeter.

2.05 MASTER GAS CONTROL VALVE AND PUSH BUTTON STATION

- A. Valve shall close by push button switch located where shown on the Drawings and by a solenoid valve in the gas piping.
- B. Solenoid valve shall be explosion proof, 2-way, packless, for normally closed operation. Valve shall be constructed of forged brass body with BUNA "N" seat, shall operate on 120 volt, single phase, with continuous duty molded Class "A" coil and shall be sized to pass the total design volume of cubic feet per hour of gas. Valve shall have manual reset.
- C. Valve shall be Model 8031B83 as manufactured by Automatic Switch Company.
- D. Provide a push button switch to activate the solenoid valve for installation by the electrical trade. All wiring shall be done by the electrical trade.

2.06 GAS METER

- A. Gas Meter: Positive displacement rotary type meter, conforming to ANSI/ASC-B109.3 and ANSI C12.1, with local readout and solid state pulser, generating low frequency pulses representing volumetric information, mounted directly to digit non-compensated index registers displacing volume in actual cubic feet (ACF), and drive rate of 10 cubic feet per revolution; "ROOTS Series B Series 3 Solid State Pulsar" by DMD/Dresser.
1. Solid-state pulser shall be compatible with the Johnson Controls (JCI) Metasys N2 system, Campus Energy Management System (EMS) Pulsar connector(s) shall be

2. single or dual with Amphenol or conduit type connectors as directed by Campus.
Meter size shall be based upon inlet gas pressure and 85 percent of total connected load.
 - a. Total gas load: 4,241 CFH
 - b. Gas pressure: 5 psi
- B. Gas Meter: Diaphragm type meter, conforming to ANSI/ASC-B109.3 and ANSI C12.1, with local readout and automatic pulse generating unit representing volumetric information, mounted directly to digit non-compensated index registers displacing volume in actual cubic feet (ACF); "Model AR-250-RVP-FI" by American Meter.
 1. Pulsar shall deliver 4 ma pulse for each cubic feet of gas.
 2. Switch shall be rated for 24 volt and 100 ma max signal.
 3. Pulsar connector(s) shall be single or dual with Amphenol or conduit type connectors as directed by Campus.
 4. Meter size shall be based upon inlet gas pressure and 100 percent of total connected load:
 - a. Total gas load: 32,000 BTU/HR
 - b. Gas pressure: 5 psi
 5. Provide wiring to Building Management System (BMS)

2.07 MISCELLANEOUS

- A. Vent Cap:
 1. ¾-inch to 1-inch pipe size: Aluminum body, built-in drip edge for rain and painter protection, full size venting sized to compensate for effective screen opening, stainless steel screen; similar to "Blo-Vent" by UPSCO.
 2. 2-inch pipe size: 180-degree return bend steel end with 0.23 gauge stainless steel 12-inch by 12-inch mesh screen on outlet; "2-inch Return Bend" by UPSCO.
 3. 1¼-inch to 4-inch pipe size: Iron body, 90-degree elbow with standard pipe thread with 12-inch by 12-inch mesh stainless steel screen on outlet; "Gas Vent" by UPSCO.

PART 3 – EXECUTION

3.01 INSTALLATION

- A. Install piping without pockets, with drips at low points, and with valves at each outlet.
- B. Use right and left nipples. Do not use bushings, unions and compression couplings.
- C. Gas piping within the building below grade is to be run in casings or conduits and to be properly vented at both ends.
- D. Gas piping run in plenum spaces, regardless of size to be welded and shall be run in a two-hour enclosure. No valves shall be installed in plenum spaces.
- E. Provide dielectric union between buried steel gas piping using listed isolation fitting.

3.02 APPLICATION

- A. Manual shut-off valves used on piping systems shall be as indicated for pipe sizes in PART 2.
- B. Over-Pressurization Relief Valve: Provide capacity in valve for full relief capacity when pressure regulator fails in widest position and include vent pipe rising 7 feet-0 inches above grade.
- C. Provide earthquake valve before gas line enters building and downstream of service exterior shut-off valve. Installation shall be in compliance with utility guidelines and not installed upstream of the gas meter or regulator unless approved by local utility company.

3.03 TESTING AND ADJUSTMENTS

- A. Test the gas piping system by means of an air pump and mercury gauge to a pressure equal to the maintenance of a column of mercury 12 inches high for a period of 10 minutes. Conduct the test in the presence of all required inspectors.
- B. Test under air pressure to 60 to 80 pounds per square inch for minimum one hour duration. Measure natural gas system test pressure with a water manometer or an equivalent device calibrated in increments not greater than 0.1 inch water column. System shall not be approved until it can be demonstrated that there is no measurable loss of test pressure during the test period.
- C. Submit all test reports, witnessed by City Inspectors, to the Project Manager.

END OF SECTION 22 62 13