METROLINX

Natural Gas Piping System Specification

Specification 23 11 23

Revision 02
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Metrolinx,

an Agency of the Government of Ontario

Amendment Record Sheet

Amendment in Clause No.	Date of Amendment	Description of Changes
Section 3.7	March 2023	Added section 3.7 Protection of natural gas service in public spaces

LIST OF CONTENT

1. GENERAL

1.1. SCOPE OF WORK

1.1.1. Provide natural gas piping system as detailed on drawings and as specified herein.

1.2. DESIGN REQUIREMENTS

1.2.1. Design requirements are based on Part 2 specified requirements of products.

1.3. RELATED WORKS

1.3.1. Section 20 05 05 - Mechanical Work General Instructions.

1.3.2. Section 20 05 10 - Basic Mechanical Materials and Methods.

1.3.3. Section 20 05 40 – Mechanical Work Commissioning.

1.4. REFERENCE STANDARDS

1.4.1. Standards and codes to be latest editions adopted by and enforced by local governing authorities.

1.4.2. ANSI B2.1 Pipe Threads (Except Dryseal).

1.4.3. ANSI Z21.70 Shutoff Systems, Earthquake Actuated Automatic Gas.

1.4.4. ASTM 53 Standard Specification for Pipe, Steel, Black and Hot-Dipped, Zinc-Coated, Welded and Seamless.

1.4.5. ASTM A105 Standard Specification for Carbon Steel Forgings for Piping Applications.

1.4.6. ASTM B61 Standard Specification for Steam or Valve Bronze Castings.

1.4.7. ASTM B837 10 Standard Specification for Seamless Copper Tube for Natural Gas and Liquefied Petroleum (LP) Gas Fuel Distribution Systems.

1.4.8. CSA B137.4. Polyethylene Piping Systems for Gas Services.

1.4.9. CAN/CSA B149.1, Natural Gas and Propane Installation Code.

1.5. SPARE PARTS

1.5.1. Spare valves and regulators quantity of 4 of each type, unless otherwise confirmed with Metrolinx.

1.6. TRAINING

1.6.1. Training is to be a full review of all components including but not limited to a full operation and maintenance demonstration, with abnormal events.

1.6.2. Include for 6 training sessions of maximum 7 hours duration per session for 10 Metrolinx people per session.

1.6.3. Refer to Section 20 05 05 for additional general requirements.

1.7. WARRANTY

1.7.1. Products to be guaranteed by manufacturer, for a minimum of 2 years after acceptance by Metrolinx.

1.8. DELIVERY, STORAGE AND HANDLING.

1.8.1. Handle and store products in accordance with manufacturer's instructions, in locations approved by Metrolinx. Include one copy of these instructions with product at time of shipment.

1.9. SUBMITTALS

1.9.1. Refer to submittal requirements in Section 20 05 05.

1.9.2. Submit shop drawings/product data for all products specified in Part 2 of this Section except for pipe, fittings, and unions. Indicate performance criteria, conformance to appropriate reference standards, and limitations.

1.9.3. Product Data

a) Submit manufacturer's Product data indicating:

1) technical data, supplemented by bulletins, component illustrations, detailed views, technical descriptions of items, and parts lists;

2) performance criteria, compliance with appropriate reference standards, characteristics, limitations, and troubleshooting protocol;

3) product transportation, storage, handling, and installation requirements;

4) product identification in accordance with Metrolinx requirements.

1.9.4. Shop Drawings

a) Submit shop drawings including:

1) for each gas pressure regulating station, submit:

i) selection sheet for each pressure reducing valve (PRV), indicating connected equipment, heating loads, design allowance, meter model, body size, spring range and orifice size;

ii) selection sheet for each relief valve(s) serving a PRV.

2) capacity and ratings;

3) dimensions;

4) mounting details to suit locations shown, indicating methods and hardware to be used;

5) control components and control wiring schematic.

1.9.5. Commissioning Package

a) Submit the following in accordance with Sections 20 05 05 and 20 05 40:

1) Commissioning Plan;

2) Commissioning Procedures;

3) Certificate of Readiness;

4) complete test sheets specified in Section 20 05 40 and attach them to the Certificate of Readiness;

5) Source Quality Control inspection and test results and attach to the Certificate of Readiness.

1.9.6. Commissioning Closeout Package

a) Submit the following in accordance with Section 20 05 05:

1) Deficiency Report;

2) Commissioning Closeout Report;

3) Submit the following for each Product for incorporation into the Operation and Maintenance Manuals in accordance with Section 20 05 05:

   i) Identification: manufacturer's name, type, year, serial number, number of units, capacity, and identification to related systems;

   ii) functional description detailing operation and control of components;

   iii) performance criteria and maintenance data;

   iv) safety precautions;

   v) operating instructions and precautions;

   vi) component parts availability, including names and addresses of spare part suppliers;

   vii) maintenance and troubleshooting guidelines/protocol;

   viii) product storage, preparation, handling, and installation requirements;

   ix) Commissioning Report.

1.10. QUALITY ASSURANCE

1.10.1. Gas system work is to be in accordance with requirements of CAN/CSA B149.1, Natural Gas and Propane Installation Code, as amended by local Gas Codes.

1.10.2. Apply for, on TSSA forms, approval of gas system design by TSSA prior to work beginning at site and prior to ordering any equipment. Submit completed TSSA Form and copies of shop drawings/product data sheets as required to TSSA and obtain an approval certificate. Pay costs for TSSA review and approval process. If TSSA requires revisions to the system and revisions result in an extra cost, a Notice of Change will be issued by Consultant for the revision.

1.10.3. Manufacturers Qualifications

a) Manufacturer shall be ISO 9000, 9001 or 9002 certified. Manufacturer of product shall have produced similar product for a minimum period of five years. When requested by Consultant, an acceptable list of installations with similar product shall be provided demonstrating compliance with this requirement.

b) Where manufacturers provide after installation onsite inspection of product installations, include for manufacturer's authorized representative to perform onsite inspection and certificate of approvals.

1.10.4. Installers Qualifications

a) Installers for work to be performed by or work under licensed Mechanical Contractor.

b) Installers of equipment, systems and associated work are to be fully qualified and experienced installers of respective products and work in which they are installing.

c) Gas system work is to be performed only by licensed gas pipe fitters (holding Gas Technician 1 Certificate) authorized under TSSA Act.

d) Where manufacturers provide training sessions to installers and certificates upon successful completion, installers to have obtained such certificates and submit copies with shop drawings.

1.10.5. Regulatory Requirements:

a) Products and work to comply with applicable local governing authority regulations, bylaws and directives.

b) Include for required inspections and certificate of approvals of installation work from local governing authorities.

2. PRODUCTS

2.1. PIPE, FITTINGS AND JOINTS

2.1.1. Coated Black Steel - Welded Joints

a) "Yellow Jacket" Schedule 40 mild black carbon steel, ASTM A53, Grade B, factory coated with yellow plastic, mill or site bevelled, and complete with forged steel butt welding fittings and welded joints. Clean bare metal surfaces and protect from corrosion with a suitable Denso primer and tape corrosion protection system.

2.1.2. Polyethylene

a) Safety yellow coloured polyethylene pipe, fittings, and joints to CSA B137.4.

2.1.3. Coated Copper

a) Type "K" soft temper copper with a factory applied external yellow plastic coating and flare fittings with forged brass nuts to CAN/CSA B149.1 and stamped with designation C37700 to indicate they are forged brass.

2.1.4. Uncoated Black Steel - Screwed Joints

a) Schedule 40 mild black carbon steel, ASTM A53, Grade B, complete with malleable cast iron screwed fittings to ANSI B2.1, and screwed joints.

2.1.5. Uncoated Black Steel - Welded Joints

a) Schedule 40 mild black carbon steel, ASTM A53, Grade B, mill or site bevelled, complete with factory made forged steel butt welding fittings and welded joints.

2.1.6. Copper - Uncoated

a) Type "G" seamless copper tubing to ASTM B837, hard temper with wrought copper capillary brazed joint type fittings to ASTM B.61, and brazed joints made with "Sil-Fos" or "Sil-Fos 5" brazing alloy, or, soft temper with flared brass fittings of a single 45° flare type, forged or with a machined long nut and copper to copper threaded connectors, and, where required, flared brass copper to NPS adapters.

2.1.7. Flexible Stainless Steel

a) Flexible, CSA certified, 860 kPa (125 psi) rated, gas-tight, convoluted stainless steel tubing factory jacketed with a bright yellow PVC coating which is continuously identified. Supply tubing in coils and complete with factory attached stainless steel end fittings, and adapter unions, protective plates, and steel clamps.

2.1.8. Standard of quality assurance manufacturers are:

a) Tru-Flex Metal Hose LLC. "Pro-Flex";

b) Titeflex Corp. "Gastite";

c) Omega Flex Canada "TracPipe"

d) or approved equivalent.

2.2. PIPING UNIONS

2.2.1. Screwed Piping

a) Malleable iron, ground joint, bronze or brass to iron or bronze to bronze seat screwed unions and union elbows with a minimum pressure rating of 1725 kPa (250 psi) steam at 260°C (500°F).

2.2.2. Flanged Piping

a) Forged carbon steel slip-on type raised faced welding flange unions to ASTM A105, 150 lb. Class for steel pipe, and slip-on type 150 lb. Class bronze flanges for copper pipe.

2.2.3. Copper to Steel

a) Kamco Products "Copper Stopper";

b) or approved equivalent.

2.3. EARTHQUAKE ACTIVATED AUTOMATIC SHUT-OFF VALVE

2.3.1. KAS International or Nihon Koso Model 315 HPF or approved equivalent, earthquake activated, flanged, high pressure automatic shut-off valve suitable for both natural gas and propane, ULC listed and in accordance with ANSI Z21.70, Earthquake Actuated Automatic Gas Shutoff Systems.

2.4. SHUT-OFF VALVES

2.4.1. Ball Type for piping 1/4" to 4" dia. inside or outside building:

a) CSA certified, minimum 3100 kPa (450 psi) WOG rated, 1/4 turn, full port non-lubricated brass ball valves, each complete with a Teflon PTFE seat, chrome plated solid ball, removable lever handle, and screwed ends.

b) Standard of quality assurance manufacturers are:

1) Neo Valves Inc. #425;

2) Kitz Corp. Code 58;

3) Toyo Valve Co. Fig. 5044A;

4) or approved equivalent.

2.4.2. Plug or Ball Type for piping 4" to 8" dia. inside or outside building:

a) CSA certified, plain face flanged, Class 125, 1380 kPa (200 psi) rated, 1/4 turn, cast iron lubricated plug valves, each wrench operated and complete with cylindrical plug with lubricant grooves, lubricant screw, and lubricant receptacle, or full port carbon steel ball valves with flanged ends;

b) Standard of quality assurance manufacturers are:

1) Neo Valves Inc. #1AS40114 plug valve;

2) Newman Hattersley #171M plug valve;

3) Kitz Corp. Code No. 150 SCTAM-FS-CGA ball valve;

4) or approved equivalent.

2.5. NATURAL GAS CONVENIENCE OUTLET

2.5.1. Neo Valves Model 3/375 or approved equivalent, quick-connect type CSA certified outlet with interlocking safety cam to prevent release of appliance connector until valve is off, integral thermal protection to prevent gas flow if outlet is exposed to temperatures exceeding 90°C (195°F), and a wall enclosure box.

2.5.2. Standard of quality assurance manufacturers are:

a) Neo Valves Inc.;

b) Fairview Fittings & Mfg. Ltd;

c) or approved equivalent.

2.6. PRESSURE REGULATORS

2.6.1. CSA certified pressure regulators as follows:

a) Vented Type: spring-loaded self-operated design, tight closing, selected for facility gas pressure and piping pressure loss, and connected equipment load at full firing rate plus 20% spare, and complete with:

1) 1035 kPa (150 psi) rated cast iron body finished with corrosive resistant epoxy enamel;

2) aluminum diaphragm and spring case with Nitrile diaphragm, disc, and body O-ring;

3) throttling type, high flow rate, tight shut-off relief valve selected to protect equipment downstream of regulator in coordination with regulator capacity.

2.6.2. Standard of quality assurance manufacturers are:

a) Maxitrol Co.;

b) Fisher Controls;

c) Leslie Controls Inc.;

d) Lakeside Process Controls;

e) or approved equivalent.

3. EXECUTION

3.1. DEMOLITION

3.1.1. Perform required gas system demolition work. Refer to demolition requirements specified in Section 20 05 35.

3.2. NATURAL GAS SERVICE

3.2.1. Make required arrangement with natural gas supply utility on behalf of Owner for installation of natural gas service piping with gas pressure regulator and meter assembly.

3.2.2. Provide an earthquake activated automatic shut-off valve in gas service piping outside building in accordance with valve manufacturer's installation instructions. Provide an angle iron framed wire mesh enclosure around valve and bolt to wall.

3.2.3. Provide 2 m (7') high minimum 200 mm (8") diameter Schedule 80 galvanized steel concrete filled bollards at meter-regulator location in a pattern to protect meter-regulator. Install pipe straight and plumb a 1.2 m (4') below grade in a continuous 600 mm (2') diameter reinforced concrete footing. Smoothly crown top of concrete above the top of the pipe.

3.3. NATURAL GAS PIPING INSTALLATION REQUIREMENTS

3.3.1. Provide required natural gas distribution piping and connect gas fired or operated equipment, and provide required vent piping to atmosphere, including vent piping from pressure regulators. Perform piping work in accordance with requirements of CAN/CSA B149.1, Natural Gas and Propane Installation Code, as amended by local Gas Codes.

3.3.2. Piping is to be as follows:

a) for underground piping, coated Schedule 40 black steel, coated soft copper, or polyethylene;

b) for aboveground piping, uncoated Schedule 40 black steel, hard temper or soft copper, or, if permitted, flexible stainless steel.

3.3.3. Ensure supports for roof mounted piping are sized (height) to accommodate roof slope and required piping slope, and to permit installation of low point dirt pockets.

3.3.4. Provide full pipe diameter 150 mm (6") long drip pockets at bottom of vertical risers, at piping low points, and wherever else shown and/or required.

3.3.5. Identify natural gas piping aboveground with 2 coats of safety yellow enamel applied over primer, and SMS Ltd. or approved equivalent coil type vinyl identification makers with arrows.

3.3.6. For underground gas piping, provide continuous 75 mm (3") wide yellow PVC warning tape with "CAUTION - GAS LINE BURIED BELOW" wording at 750 mm (30") intervals located above pipe approximately 250 mm (10") below grade.

3.4. INSTALLATION OF SHUT-OFF VALVES

3.4.1. Provide CSA approved ball type or lubricated plug type shut-off valves to isolate equipment, and wherever else shown.

3.4.2. Ensure valves are located for easy accessibility and maintenance.

3.5. INSTALLATION OF NATURAL GAS CONVENIENCE OUTLETS

3.5.1. Provide natural gas convenience outlets and wall mount.

3.5.2. Provide a shut-off valve in connecting piping, confirm exact location prior to roughing-in, and ensure outlet is rigidly secured in place.

3.6. INSTALLATION OF PRESSURE REGULATORS

3.6.1. Provide pressure regulators in gas distribution piping where indicated and/or required.

3.6.2. Use vented type pressure regulators for all other applications.

3.6.3. Install regulating stations in accordance with requirements of CAN/CSA B149.1.

3.6.4. Provide 6 mm (¼") diameter test ports upstream and downstream of each regulator assembly.

3.6.5. Locate outdoor regulating stations a minimum of 300 mm (12") away from walkways, and 3 m (10') away from equipment air intakes and building openings. Provide required vent piping and terminate vents in a turn-down elbow fitting with bronze bug screen secured in place.

3.6.6. Locate indoor regulating stations in locations accessible without use of ladders or lifts. Combine vents where permitted and increase vent pipe size accordingly. Extend vent piping up through roof 3 m (10') away from equipment air intakes and building openings and terminated in a turn-down elbow fitting with bronze bug screen secured in place.

3.6.7. Indicate operating set-points, relief settings and vent arrangements for each regulating station on as-built record drawings.

3.7. PROTECTION OF NATURAL GAS SERVICE IN PUBLIC SPACES

3.7.1. Where a natural gas service is located outdoors in an area that is also accessible by the public, the devices and equipment forming part of this natural gas service (i.e. meters, pressure regulating valves, isolation valves, earthquake shutoff valves etc.) shall be protected from vandalism and tampering with the provision of a lockable fenced enclosure (for entire gas meter assembly) or dedicated lockable enclosures rated for outdoor weather use for single pieces of equipment/device.

END OF SECTION