
Oakhurst Dairy – New Milk Cooler**SECTION 15194 - FUEL GAS PIPING****PART 1 - GENERAL****1.1 RELATED DOCUMENTS**

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to this Section.

1.2 SUMMARY

- A. This Section includes fuel gas piping from discharge side of gas meter/regulator. Products include the following:
 - 1. Pipe, tube, fittings, and joining materials.
 - 2. Piping specialties.
 - 3. Specialty valves.
 - 4. Pressure regulators.

1.3 PROJECT CONDITIONS

- A. Gas System Pressures: Two pressure ranges. Primary pressure is more than 0.5 psig but not more than 2.0 psig, and is reduced to secondary pressure of 0.5 psig or less.
- B. Design values of fuel gas supplied for these systems are as follows:
 - 1. Nominal Heating Value: 1000 Btu/cu. ft.
 - 2. Nominal Specific Gravity: 0.6.

1.4 SUBMITTALS

- A. Product Data: For the following:
 - 1. Specialty valves. Include pressure rating, capacity, settings, and electrical connection data of selected models.
 - 2. Pressure regulators. Include pressure rating, capacity, and settings of selected models.
- B. Welding certificates.
- C. Field quality-control test reports.
- D. Operation and Maintenance Data: For natural gas specialties and accessories to include in emergency, operation, and maintenance manuals.

1.5 QUALITY ASSURANCE

- A. Welding: Qualify processes and operators according to ASME Boiler and Pressure Vessel Code: Section IX.
- B. NFPA Standard: Comply with NFPA 54, "National Fuel Gas Code."

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- A. Handling Flammable Liquids: Remove and legally dispose of liquids from drips in existing gas piping. Handle cautiously to avoid spillage and ignition. Notify fuel gas supplier. Handle flammable liquids used by Installer with proper precautions and do not leave on premises from end of one day to beginning of next day.

PART 2 - PRODUCTS**2.1 MANUFACTURERS**

- A. In other Part 2 articles where titles below introduce lists, the following requirements apply to product selection:
1. Available Manufacturers: Subject to compliance with requirements, manufacturers offering products that may be incorporated into the Work include, but are not limited to, manufacturers specified.
 2. Manufacturers: Subject to compliance with requirements, provide products by one of the manufacturers specified.

2.2 PIPING MATERIALS

- A. Refer to Part 3 "Piping Applications" Article for applications of pipe, tube, fitting, and joining materials.

2.3 PIPES, TUBES, FITTINGS, AND JOINING MATERIALS

- A. Steel Pipe: ASTM A 53/A 53M; Type E or S; Grade B; black. Wall thickness of wrought-steel pipe shall comply with ASME B36.10M.
1. Malleable-Iron Threaded Fittings: ASME B16.3, Class 150, standard pattern, with threaded ends according to ASME B1.20.1.
 2. Steel Threaded Fittings: ASME B16.11, forged steel with threaded ends according to ASME B1.20.1.
 3. Steel Welding Fittings: ASME B16.9, wrought steel or ASME B16.11, forged steel.
 4. Unions: ASME B16.39, Class 150, malleable iron with brass-to-iron seat, ground joint, and threaded ends according to ASME B1.20.1.
 5. Cast-Iron Flanges and Flanged Fittings: ASME B16.1, Class 125.
 6. Joint Compound and Tape: Suitable for natural gas.
 7. Steel Flanges and Flanged Fittings: ASME B16.5.
 8. Gasket Material: Thickness, material, and type suitable for natural gas.

2.4 PIPING SPECIALTIES

- A. Flexible Connectors: ANSI Z21.24, copper alloy.
- B. Quick-Disconnect Devices: ANSI Z21.41, convenience outlets and matching plug connector.

2.5 SPECIALTY VALVES

- A. Valves, NPS 2 and Smaller: Threaded ends according to ASME B1.20.1 for pipe threads.

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- B. Valves, NPS 2-1/2 and Larger: Flanged ends according to ASME B16.5 for steel flanges and according to ASME B16.24 for copper and copper-alloy flanges.
- C. Valves in category below are limited to 0.5 psig (3.45 kPa), are used for shutoff service to appliances, and are NPS 3/4 (DN 20) and smaller.
- D. Appliance Connector Valves: ANSI Z21.15 and CSA International listed.
 - 1. Manufacturers:
 - a) American Valve Inc.
 - b) B&K Industries, Inc.
 - c) Brass Craft Manufacturing Co.
 - d) Cimberio Valves, S. p. A.
 - e) Conbraco Industries, Inc.; Apollo Div.
 - f) E. M. Plastic and Electric Products, Ltd.; Neo Valve Div.
 - g) JMF Company.
 - h) Jomar International Ltd.
 - i) Key Gas Components, Inc.
 - j) Legend Valve and Fitting, Inc.
 - k) McDonald, A. Y. Mfg. Co.
 - l) Mueller Co.; Mueller Gas Products Div.
 - m) Newman Hattersley Ltd.; Specialty Valves Div.
 - n) Robert Manufacturing Co.
 - o) State Metals, Inc.
 - p) Watts Industries, Inc.; Water Products Div.
- E. Gas Valves, NPS 2 and Smaller: ASME B16.33 and CSA International-listed bronze body and 125-psig pressure rating.
 - 1. Manufacturers:
 - a) BMI Canada, Inc.
 - b) Crane Valves.
 - c) Dungs, Karl, Inc.
 - d) Flow Control Equipment, Inc.
 - e) Grinnell Corp.
 - f) Honeywell International Inc.
 - g) Jomar International Ltd.
 - h) KITZ Corporation.
 - i) Legend Valve and Fitting, Inc.
 - j) Lyall, R. W. & Co., Inc.
 - k) McDonald, A. Y. Mfg. Co.
 - l) Milwaukee Valve Company.
 - m) Mueller Co.; Mueller Gas Products Div.
 - n) NIBCO INC.
 - o) Red-White Valve Corp.
 - p) Velan Inc.
 - q) Watts Industries, Inc.; Water Products Div.

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2. Tamperproof Feature: Include design for locking.
- F. Plug Valves, NPS 2-1/2 and Larger: ASME B16.38 and MSS SP-78 cast-iron, lubricated plug valves, with 125-psig pressure rating.
1. Manufacturers:
 - a) Flow Control Equipment, Inc.
 - b) Milliken Valve Co., Inc.
 - c) Nordstrom Valves, Inc.
 - d) Olson Technologies, Inc.; Homestead Valve Div.
 - e) Walworth Co.
 2. Tamperproof Feature: Include design for locking.

2.6 PRESSURE REGULATORS

- A. Description: Single stage and suitable for fuel gas service. Include steel jacket and corrosion-resistant components, elevation compensator, and atmospheric vent.
1. Manufacturers:
 - a) Line Pressure Regulators:
 - 1) American Meter Company.
 - 2) Donkin, Bryan RMG Canada, Ltd.
 - 3) Eclipse Combustion, Inc.
 - 4) Fisher Controls International, Inc.; Division of Emerson.
 - 5) Invensys.
 - 6) Maxitrol Company.
 - 7) National Meter Industries, Inc.
 - 8) Richards Industries, Inc.; Jordan Valve Div.
 - 9) Schlumberger Limited; Gas Div.
 - b) Appliance Pressure Regulators:
 - 1) Canadian Meter Co., Inc.
 - 2) Eaton Corporation; Controls Div.
 - 3) Harper Wyman Co.
 - 4) Maxitrol Company.
 - 5) SCP, Inc.
 2. NPS 2 and Smaller: Threaded ends according to ASME B1.20.1 for pipe threads.
 3. Line Pressure Regulators: ANSI Z21.80 with 2-psig inlet pressure rating.
 4. Appliance Pressure Regulators: ANSI Z21.18. Regulator may include vent limiting device, instead of vent connection, if approved by authorities having jurisdiction.
- B. Pressure Regulator Vents: Factory- or field-installed, corrosion-resistant screen in opening if not connected to vent piping.

PART 3 - EXECUTION**3.1 EXAMINATION**

- A. Examine roughing-in for fuel oil piping system to verify actual locations of piping connections before equipment installation.

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1. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 PREPARATION

- A. Close equipment shutoff valves before turning off fuel gas to premises or section of piping. Perform leakage test as specified in "Field Quality Control" Article to determine that all equipment is turned off in affected piping section.

3.3 PIPING APPLICATIONS

- A. Flanges, unions, transition, and special fittings with pressure ratings same as or higher than system pressure rating may be used in applications below, unless otherwise indicated.
- B. Select from piping materials below. Coordinate with materials specified in Part 2. Do not use sizes smaller than NPS 1/2 (DN 15), except for corrugated, stainless-steel tubing systems.
- C. Fuel Gas Piping, 2 psig or Less:
 1. NPS 1/2 and Smaller: NPS 3/4 steel pipe, malleable-iron threaded fittings, and threaded.
 2. NPS 3/4 and NPS 1: Steel pipe, malleable-iron threaded fittings, and threaded joints.
 3. NPS 1-1/4 to NPS 2: Steel pipe, steel welding fittings, and welded joints.

3.4 VALVE APPLICATIONS

- A. Appliance Shutoff Valves for Pressure 0.5 psig or Less: Appliance connector valve or gas stop.
- B. Appliance Shutoff Valves for Pressure 0.5 to 2 psig: Gas stop or gas valve.
- C. Piping Line Valves, NPS 2 and Smaller: Gas valve.
- D. Piping Line Valves, NPS 2-1/2 and Larger: Plug valve.

3.5 PIPING INSTALLATION

- A. Basic piping installation requirements are specified in Division 15 Section "Basic Mechanical Materials and Methods."
- B. Concealed Locations: Except as specified below, install concealed gas piping in airtight conduit constructed of Schedule 40, seamless, black steel pipe with welded joints. Vent conduit to outside and terminate with screened vent cap.
 1. Above-Ceiling Locations: Gas piping may be installed in accessible spaces, subject to approval of authorities having jurisdiction, whether or not such spaces are used as plenums. Do not locate valves above ceilings.
 2. In Partitions: Do not install concealed piping in solid partitions. Protect tubing from physical damage when installed inside partitions or hollow walls.
 - a) Exception: Tubing passing through partitions or walls.
 3. In Walls: Gas piping with welded joints and protective wrapping specified in Part 2 "Protective Coating" Article may be installed in masonry walls, subject to approval of authorities having jurisdiction.

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4. Prohibited Locations: Do not install gas piping in or through circulating air ducts, clothes or trash chutes, chimneys or gas vents (flues), ventilating ducts, or dumb-waiter or elevator shafts.
 - a) Exception: Accessible above-ceiling space specified above.
- C. Drips and Sediment Traps: Install drips at points where condensate may collect. Include outlets of service meters. Locate where readily accessible for cleaning and emptying. Do not install where condensate would be subject to freezing.
 1. Construct drips and sediment traps using tee fitting with bottom outlet plugged or capped. Use minimum-length nipple of 3 pipe diameters, but not less than 3 inches long, and same size as connected pipe. Install with space between bottom of drip and floor for removal of plug or cap.
- D. Conceal pipe installations in walls, pipe spaces, utility spaces, above ceilings, below grade or floors, and in floor channels, unless indicated to be exposed to view.
- E. Install gas piping along roof using same pipe support rack as refrigeration piping where applicable. Single run of gas piping on roof shall be on PVC pipe support with Stainless Steel roller.
- F. Use eccentric reducer fittings to make reductions in pipe sizes. Install fittings with level side down.
- G. Connect branch piping from top or side of horizontal piping.
- H. Install unions in pipes NPS 2 and smaller, adjacent to each valve, at final connection to each piece of equipment, and elsewhere as indicated. Unions are not required on flanged devices.
- I. Install strainer on inlet of each line pressure regulator.
- J. Install pressure gage upstream and downstream from each line pressure regulator. Pressure gages are specified in Division 15 Section "Meters and Gages."
- K. Install flanges on valves, specialties, and equipment having NPS 2-1/2 and larger connections.
- L. Install vent piping for gas pressure regulators and gas trains, extend outside building, and vent to atmosphere. Terminate vents with turned-down, reducing-elbow fittings with corrosion-resistant insect screens in large end.

3.6 JOINT CONSTRUCTION

- A. Basic piping joint construction is specified in Division 15 Section "Basic Mechanical Materials and Methods."
- B. Use materials suitable for fuel gas.
- C. Patch factory-applied protective coating as recommended by manufacturer at field welds and where damage to coating occurs during construction.

3.7 HANGER AND SUPPORT INSTALLATION

- A. Pipe hanger and support and equipment support materials and installation requirements are specified in Division 15 Section "Hangers and Supports."

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- B. Maximum spans below are from NFPA 54 or MSS SP-69. Most restrictive dimensions are described in first paragraph and subparagraphs below. Copper-tube sizes were adjusted to ASTM B 88 (ASTM B 88M).
- C. Install hangers for horizontal steel piping with the following maximum spacing and minimum rod sizes:
 - 1. NPS 1 and Smaller: Maximum span, 96 inches; minimum rod size, 3/8 inch.
 - 2. NPS 1-1/4: Maximum span, 108 inches; minimum rod size, 3/8 inch.
 - 3. NPS 1-1/2 and NPS 2: Maximum span, 108 inches; minimum rod size, 3/8 inch.
 - 4. NPS 2-1/2 to NPS 3-1/2: Maximum span, 10 feet; minimum rod size, 1/2 inch.
 - 5. NPS 4 and Larger: Maximum span, 10 feet; minimum rod size, 5/8 inch.

3.8 CONNECTIONS

- A. Drawings indicate general arrangement of fuel gas piping, fittings, and specialties.
- B. Install piping adjacent to appliances to allow service and maintenance.
- C. Connect piping to appliances using gas with shutoff valves and unions. Install valve upstream from and within 72 inches of each appliance. Install union downstream from valve.
- D. Sediment Traps: Install tee fitting with capped nipple in bottom to form drip, as close as practical to inlet of each appliance using gas.

3.9 LABELING AND IDENTIFYING

- A. Equipment Nameplates and Signs: Install engraved plastic-laminate equipment nameplate or sign on or near each service meter, pressure regulator, and specialty valve.
 - 1. Text: In addition to name of identified unit, distinguish between multiple units, inform operator of operational requirements, indicate safety and emergency precautions, and warn of hazards and improper operations.
 - 2. Nameplates, pipe identification, and signs are specified in Division 15 Section "Mechanical Identification."

3.10 PAINTING

- A. Use materials and procedures in Division 9 painting Sections.
- B. Paint exterior service meters, pressure regulators, and specialty valves.
 - 1. Color: Gray.
- C. Paint gas piping color yellow.

3.11 FIELD QUALITY CONTROL

- A. Test, inspect, and purge piping according to NFPA 54 and requirements of authorities having jurisdiction.
- B. Repair leaks and defects with new materials and retest system until satisfactory results are obtained.

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- C. Verify capacities and pressure ratings of service meters, pressure regulators, valves, and specialties.
- D. Verify correct pressure settings for pressure regulators.
- E. Verify that specified piping tests are complete.

END OF SECTION 15194