SECTION 231123

FACILITY NATURAL-GAS PIPING

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**NOTE TO SPECIFIER**

*Use this Specification Section for Mail Processing Facilities.*

***This is a Type 2 Specification with primarily editable text; therefore, most of the text can be edited, but there is some required text which is noted within the Section with a “Note to Specifier.” Do not revise these paragraphs without an approved Deviation from USPS Headquarters, Facilities Program Management, through the USPS Project Manager.***

*For Design/Build projects, do not delete the Notes to Specifier in this Section so that they may be available to Design/Build entity when preparing the Construction Documents.*

*For the Design/Build entity, this specification is intended as a guide for the Architect/Engineer preparing the Construction Documents.*

*The MPF specifications may also be used for Design/Bid/Build projects. In either case, it is the responsibility of the design professional to edit the Specifications Sections as appropriate for the project.*

*Text shown in brackets must be modified as needed for project specific requirements.* *See the “Using the USPS Guide Specifications” document in Folder C for more information.*

*The last date that USPS revised this standard specification section occurs in two places, at the end of this section and in the Table of Contents. If the date in this section matches the date in the Table of Contents, then you are using the latest version. Do not delete or revise the “last revised” date at the end of the section during the development of the Project Manual.*

*The footer in this section should be edited to replace the text, “USPS MPF SPECIFICATION” with the project name, and the blank date in the center should be replaced with the submission date, for interim design reviews, or the issue date of the completed Project Manual.*

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1. GENERAL
   1. SUMMARY
      1. Section Includes:
         1. Pipes, tubes, and fittings.
         2. Piping specialties.
         3. Piping and tubing joining materials.
         4. Valves.
         5. Pressure regulators.
   2. PERFORMANCE REQUIREMENTS
      1. Minimum Operating-Pressure Ratings:
         1. Piping and Valves: 100 psig minimum unless otherwise indicated.
         2. Service Regulators: 100 psig minimum unless otherwise indicated.
      2. Natural-Gas System Pressure within Buildings: More than 0.5 psig but not more than 5 psig.
      3. Natural-Gas System Pressures within Buildings: Two pressure ranges. Primary pressure is more than 0.5 psig but not more than 5 psig, and is reduced to secondary pressure of 0.5 psig or less.
      4. Delegated Design: Design restraints and anchors for natural-gas piping and equipment, including comprehensive engineering analysis by a qualified professional engineer, using performance requirements and design criteria indicated.
   3. SUBMITTALS
      1. Product Data: For each type of product indicated.
      2. Shop Drawings: For facility natural-gas piping layout. Include plans, piping layout and elevations, sections, and details for fabrication of pipe anchors, hangers, supports for multiple pipes, alignment guides, expansion joints and loops, and attachments of the same to building structure. Detail location of anchors, alignment guides, and expansion joints and loops.
      3. Delegated-Design Submittal: For natural-gas piping and equipment indicated to comply with performance requirements and design criteria, including analysis data signed and sealed by the qualified professional engineer responsible for their preparation.
         1. Detail fabrication and assembly of seismic restraints.
         2. Design Calculations: Calculate requirements for selecting seismic restraints.
      4. Welding certificates.
      5. Field quality-control reports.
      6. Operation and maintenance data.
   4. QUALITY ASSURANCE
      1. Steel Support Welding Qualifications: Qualify procedures and personnel according to AWS D1.1/D1.1M, "Structural Welding Code - Steel."
      2. Pipe Welding Qualifications: Qualify procedures and operators according to ASME Boiler and Pressure Vessel Code.
      3. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.
2. PRODUCTS

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**NOTE TO SPECIFIER**

**REQUIRED**: Piping and fittings materials must comply with the chart in Section 220000 - Plumbing

Do not revise the materials below without an approved deviation; however, items may be removed to comply with local code requirements or for building requirements for MPF Repair & Alteration or Expansion projects; verify with the facility.

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* 1. PIPES, TUBES, AND FITTINGS
     1. Steel Pipe: ASTM A 53/A 53M, black steel, Schedule 40, Type E or S, Grade B.
        1. Malleable-Iron Threaded Fittings: ASME B16.3, Class 150, standard pattern.
        2. Wrought-Steel Welding Fittings: ASTM A 234/A 234M for butt welding and socket welding.
        3. Unions: ASME B16.39, Class 150, malleable iron with brass-to-iron seat, ground joint, and threaded ends.
        4. Protective Coating for Underground Piping: Factory-applied, three-layer coating of epoxy, adhesive, and PE.
           1. Joint Cover Kits: Epoxy paint, adhesive, and heat-shrink PE sleeves.
     2. Corrugated, Stainless-Steel Tubing: Comply with ANSI/IAS LC 1.
        1. Manufacturers:
           1. OmegaFlex, Inc.
           2. Parker Hannifin Corporation; Parflex Division.
           3. Titeflex.
           4. Tru-Flex Metal Hose Corp.
        2. Tubing: ASTM A 240/A 240M, corrugated, Series 300 stainless steel.
        3. Coating: PE with flame retardant.
           1. Surface-Burning Characteristics: As determined by testing identical products according to ASTM E 84 by a qualified testing agency. Identify products with appropriate markings of applicable testing agency.

Flame-Spread Index: 25 or less.

Smoke-Developed Index: 50 or less.

* + - 1. Fittings: Copper-alloy mechanical fittings with ends made to fit and listed for use with corrugated stainless-steel tubing and capable of metal-to-metal seal without gaskets. Include brazing socket or threaded ends complying with ASME B1.20.1.
      2. Striker Plates: Steel, designed to protect tubing from penetrations.
      3. Manifolds: Malleable iron or steel with factory-applied protective coating. Threaded connections shall comply with ASME B1.20.1 for pipe inlet and corrugated tubing outlets.
      4. Grounding: Required from the last fitting back to the electrical panel or grounding rod. A separate #12 grounding wire is required to be run separate from the pipe. Gas pipe with grounding wire infused is not permitted.
    1. PE Pipe: ASTM D 2513, SDR 11.
       1. PE Fittings: ASTM D 2683, socket-fusion type or ASTM D 3261, butt-fusion type with dimensions matching PE pipe.
       2. PE Transition Fittings: Factory-fabricated fittings with PE pipe complying with ASTM D 2513, SDR 11; and steel pipe complying with ASTM A 53/A 53M, black steel, Schedule 40, Type E or S, Grade B.
       3. Anodeless Service-Line Risers: Factory fabricated and leak tested.
          1. Underground Portion: PE pipe complying with ASTM D 2513, SDR 11 inlet.
          2. Casing: Steel pipe complying with ASTM A 53/A 53M, Schedule 40, black steel, Type E or S, Grade B, with corrosion-protective coating covering. Vent casing aboveground.
          3. Aboveground Portion: PE transition fitting.
          4. Outlet shall be threaded or suitable for welded connection.
          5. Tracer wire connection.
          6. Ultraviolet shield.
          7. Stake supports with factory finish to match steel pipe casing or carrier pipe.
       4. Transition Service-Line Risers: Factory fabricated and leak tested.
          1. Underground Portion: PE pipe complying with ASTM D 2513, SDR 11 inlet connected to steel pipe complying with ASTM A 53/A 53M, Schedule 40, Type E or S, Grade B, with corrosion-protective coating for aboveground outlet.
          2. Outlet shall be threaded or suitable for welded connection.
          3. Bridging sleeve over mechanical coupling.
          4. Factory-connected anode.
          5. Tracer wire connection.
          6. Ultraviolet shield.
          7. Stake supports with factory finish to match steel pipe casing or carrier pipe.
  1. PIPING SPECIALTIES
     1. Appliance Flexible Connectors:
        1. Indoor, Fixed-Appliance Flexible Connectors: Comply with ANSI Z21.24.
        2. Indoor, Movable-Appliance Flexible Connectors: Comply with ANSI Z21.69.
        3. Outdoor, Appliance Flexible Connectors: Comply with ANSI Z21.75.
        4. Corrugated stainless-steel tubing with polymer coating.
        5. Operating-Pressure Rating: 0.5 psig.
        6. End Fittings: Zinc-coated steel.
        7. Threaded Ends: Comply with ASME B1.20.1.
        8. Maximum Length: 72 inches
     2. Quick-Disconnect Devices: Comply with ANSI Z21.41.
        1. Copper-alloy convenience outlet and matching plug connector.
        2. Nitrile seals.
        3. Hand operated with automatic shutoff when disconnected.
        4. For indoor or outdoor applications.
        5. Adjustable, retractable restraining cable.
     3. Y-Pattern Strainers:
        1. Body: ASTM A 126, Class B, cast iron with bolted cover and bottom drain connection.
        2. End Connections: Threaded ends for NPS 2 and smaller.
        3. Strainer Screen: 60-mesh startup strainer, and perforated stainless-steel basket with 50 percent free area.
        4. CWP Rating: 125 psig.
     4. Weatherproof Vent Cap: Cast- or malleable-iron increaser fitting with corrosion-resistant wire screen, with free area at least equal to cross-sectional area of connecting pipe and threaded-end connection.
  2. JOINING MATERIALS
     1. Joint Compound and Tape: Suitable for natural gas.
     2. Welding Filler Metals: Comply with AWS D10.12/D10.12M for welding materials appropriate for wall thickness and chemical analysis of steel pipe being welded.
     3. Brazing Filler Metals: Alloy with melting point greater than 1000 deg F complying with AWS A5.8/A5.8M. Brazing alloys containing more than 0.05 percent phosphorus are prohibited.
  3. MANUAL GAS SHUTOFF VALVES
     1. See "Underground Manual Gas Shutoff Valve Schedule" and "Aboveground Manual Gas Shutoff Valve Schedule" Articles for where each valve type is applied in various services.
     2. General Requirements for Metallic Valves, NPS 2 and Smaller: Comply with ASME B16.33.
        1. CWP Rating: 125 psig.
        2. Threaded Ends: Comply with ASME B1.20.1.
        3. Dryseal Threads on Flare Ends: Comply with ASME B1.20.3.
        4. Tamperproof Feature: Locking feature for valves indicated in "Underground Manual Gas Shutoff Valve Schedule" and "Aboveground Manual Gas Shutoff Valve Schedule" Articles.
        5. Listing: Listed and labeled by an NRTL acceptable to authorities having jurisdiction for valves 1 inch and smaller.
        6. Service Mark: Valves 1-1/4 inches to NPS 2 shall have initials "WOG" permanently marked on valve body.
     3. One-Piece, Bronze Ball Valve with Bronze Trim: MSS SP-110.
        1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
           1. BrassCraft Manufacturing Company; a Masco company.
           2. Conbraco Industries, Inc.; Apollo Div.
           3. Lyall, R. W. & Company, Inc.
           4. McDonald, A. Y. Mfg. Co.
           5. Perfection Corporation; a subsidiary of American Meter Company.
        2. Body: Bronze, complying with ASTM B 584.
        3. Ball: Chrome-plated brass.
        4. Stem: Bronze; blowout proof.
        5. Seats: Reinforced TFE; blowout proof.
        6. Packing: Separate packnut with adjustable-stem packing threaded ends.
        7. Ends: Threaded, flared, or socket as indicated in "Underground Manual Gas Shutoff Valve Schedule" and "Aboveground Manual Gas Shutoff Valve Schedule" Articles.
        8. CWP Rating: 600 psig.
        9. Listing: Valves NPS 1 and smaller shall be listed and labeled by an NRTL acceptable to authorities having jurisdiction.
        10. Service: Suitable for natural-gas service with "WOG" indicated on valve body.
     4. Two-Piece, Full-Port, Bronze Ball Valves with Bronze Trim: MSS SP-110.
        1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
           1. BrassCraft Manufacturing Company; a Masco company.
           2. Conbraco Industries, Inc.; Apollo Div.
           3. Lyall, R. W. & Company, Inc.
           4. McDonald, A. Y. Mfg. Co.
           5. Perfection Corporation; a subsidiary of American Meter Company.
        2. Body: Bronze, complying with ASTM B 584.
        3. Ball: Chrome-plated bronze.
        4. Stem: Bronze; blowout proof.
        5. Seats: Reinforced TFE; blowout proof.
        6. Packing: Threaded-body packnut design with adjustable-stem packing.
        7. Ends: Threaded, flared, or socket as indicated in "Underground Manual Gas Shutoff Valve Schedule" and "Aboveground Manual Gas Shutoff Valve Schedule" Articles.
        8. CWP Rating: 600 psig.
        9. Listing: Valves NPS 1 and smaller shall be listed and labeled by an NRTL acceptable to authorities having jurisdiction.
        10. Service: Suitable for natural-gas service with "WOG" indicated on valve body.
     5. PE Ball Valves: Comply with ASME B16.40.
        1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
           1. Kerotest Manufacturing Corp.
           2. Lyall, R. W. & Company, Inc.
           3. Perfection Corporation; a subsidiary of American Meter Company.
        2. Body: PE.
        3. Ball: PE.
        4. Stem: Acetal.
        5. Seats and Seals: Nitrile.
        6. Ends: Plain or fusible to match piping.
        7. CWP Rating: 80 psig.
        8. Operating Temperature: Minus 20 to plus 140 deg F.
        9. Operator: Nut or flat head for key operation.
        10. Include plastic valve extension.
        11. Include tamperproof locking feature for valves where indicated on Drawings.
     6. Valve Boxes:
        1. Cast-iron, two-section box.
        2. Top section with cover with "GAS" lettering.
        3. Bottom section with base to fit over valve and barrel a minimum of 5 inches in diameter.
        4. Adjustable cast-iron extensions of length required for depth of bury.
        5. Include tee-handle, steel operating wrench with socket end fitting valve nut or flat head, and with stem of length required to operate valve.
  4. EARTHQUAKE VALVES
     1. Earthquake Valves: Comply with ASCE 25, where required by local codes or ordinance.
        1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
           1. Vanguard Valves, Inc.
           2. Pacific Seismic Products, Inc.
        2. Listing: Listed and labeled by an NRTL acceptable to authorities having jurisdiction.
        3. Maximum Operating Pressure: 5 psig.
        4. Cast-aluminum body with nickel-plated chrome steel internal parts.
        5. Nitrile-rubber valve washer.
        6. Sight windows for visual indication of valve position.
        7. Threaded end connections complying with ASME B1.20.1.
        8. Wall mounting bracket with bubble level indicator.
  5. PRESSURE REGULATORS
     1. General Requirements:
        1. Single stage and suitable for natural gas.
        2. Steel jacket and corrosion-resistant components.
        3. Elevation compensator.
        4. End Connections: Threaded for regulators NPS 2 and smaller.
     2. Line Pressure Regulators: Comply with ANSI Z21.80.
        1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
           1. Actaris.
           2. American Meter Company.
           3. Eclipse Combustion, Inc.
           4. Fisher Control Valves and Regulators; Division of Emerson Process Management.
           5. Invensys.
           6. Maxitrol Company.
           7. Richards Industries; Jordan Valve Div.
        2. Body and Diaphragm Case: Cast iron or die-cast aluminum.
        3. Springs: Zinc-plated steel; interchangeable.
        4. Diaphragm Plate: Zinc-plated steel.
        5. Seat Disc: Nitrile rubber resistant to gas impurities, abrasion, and deformation at the valve port.
        6. Orifice: Aluminum; interchangeable.
        7. Seal Plug: Ultraviolet-stabilized, mineral-filled nylon.
        8. Single-port, self-contained regulator with orifice no larger than required at maximum pressure inlet, and no pressure sensing piping external to the regulator.
        9. Pressure regulator shall maintain discharge pressure setting downstream, and not exceed 150 percent of design discharge pressure at shutoff.
        10. Overpressure Protection Device: Factory mounted on pressure regulator.
        11. Atmospheric Vent: Factory- or field-installed, stainless-steel screen in opening if not connected to vent piping.
        12. Maximum Inlet Pressure: As designed.
     3. Appliance Pressure Regulators: Comply with ANSI Z21.18.
        1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
           1. Canadian Meter Company Inc.
           2. Eaton Corporation; Controls Div.
           3. Harper Wyman Co.
           4. Maxitrol Company.
           5. SCP, Inc.
        2. Body and Diaphragm Case: Die-cast aluminum.
        3. Springs: Zinc-plated steel; interchangeable.
        4. Diaphragm Plate: Zinc-plated steel.
        5. Seat Disc: Nitrile rubber.
        6. Seal Plug: Ultraviolet-stabilized, mineral-filled nylon.
        7. Factory-Applied Finish: Minimum three-layer polyester and polyurethane paint finish.
        8. Regulator may include vent limiting device, instead of vent connection, if approved by authorities having jurisdiction.
        9. Maximum Inlet Pressure: As designed.
  6. DIELECTRIC UNIONS
     1. Manufacturers:
        1. Capitol Manufacturing Company.
        2. Central Plastics Company.
        3. Hart Industries International, Inc.
        4. McDonald, A. Y. Mfg. Co.
        5. Watts Regulator Co.; Division of Watts Water Technologies, Inc.
        6. Wilkins; Zurn Plumbing Products Group.
     2. Minimum Operating-Pressure Rating: 150 psig.
     3. Combination fitting of copper alloy and ferrous materials.
     4. Insulating materials suitable for natural gas.
     5. Combination fitting of copper alloy and ferrous materials with threaded, brazed-joint, plain, or welded end connections that match piping system materials.
  7. SLEEVES
     1. Steel Pipe Sleeves: ASTM A 53/A 53M, Type E, Grade B, Schedule 40, galvanized steel, plain ends.
     2. Cast-Iron Pipe Sleeves: Cast or fabricated "wall pipe," equivalent to ductile-iron pressure pipe, with plain ends and integral waterstop, unless otherwise indicated.
  8. MECHANICAL SLEEVE SEALS
     1. Description: Modular sealing element unit, designed for field assembly, to fill annular space between pipe and sleeve.
        1. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
           1. Advance Products & Systems, Inc.
           2. Calpico Inc.
           3. Metraflex Company (The).
           4. Pipeline Seal and Insulator, Inc.
        2. Sealing Elements: EPDM interlocking links shaped to fit surface of pipe. Include type and number required for pipe material and size of pipe and sleeve.
        3. Pressure Plates: Stainless steel.
        4. Connecting Bolts and Nuts: Stainless steel of length required to secure pressure plates to sealing elements. Include one nut and bolt for each sealing element.
  9. LABELING AND IDENTIFYING
     1. Detectable Warning Tape: Acid- and alkali-resistant, PE film warning tape manufactured for marking and identifying underground utilities, a minimum of 6 inches wide and 4 mils thick, continuously inscribed with a description of utility, with metallic core encased in a protective jacket for corrosion protection, detectable by metal detector when tape is buried up to 30 inches deep; colored yellow.

1. EXECUTION
   1. OUTDOOR PIPING INSTALLATION
      1. Comply with NFPA 54, the International Fuel Gas Code for installation and purging of natural-gas piping.
      2. Install underground, natural-gas piping buried at least 36 inches below finished grade. Comply with requirements in Division 31 Section "Earth Moving" for excavating, trenching, and backfilling.
         1. If natural-gas piping is installed less than 36 inches below finished grade, install it in containment conduit.
      3. Install underground, PE, natural-gas piping according to ASTM D 2774.
      4. Steel Piping with Protective Coating:
         1. Apply joint cover kits to pipe after joining to cover, seal, and protect joints.
         2. Repair damage to PE coating on pipe as recommended in writing by protective coating manufacturer.
         3. Replace pipe having damaged PE coating with new pipe.
      5. Copper Tubing with Protective Coating:
         1. Apply joint cover kits over tubing to cover, seal, and protect joints.
         2. Repair damage to PE coating on pipe as recommended in writing by protective coating manufacturer.
      6. Install fittings for changes in direction and branch connections.
      7. Exterior-Wall Pipe Penetrations: Seal penetrations using steel or cast-iron pipe sleeves and mechanical sleeve seals. Select sleeve size to allow for 1-inch annular clear space between pipe and sleeve for installing mechanical sleeve seals.
      8. Mechanical Sleeve Seal Installation: Select type and number of sealing elements required for pipe material and size. Position pipe in center of sleeve. Assemble mechanical sleeve seals and install in annular space between pipe and sleeve. Tighten bolts against pressure plates that cause sealing elements to expand and make watertight seal.
   2. INDOOR PIPING INSTALLATION
      1. Comply with NFPA 54, the International Fuel Gas Code for installation and purging of natural-gas piping.
      2. Drawing plans, schematics, and diagrams indicate general location and arrangement of piping systems. Indicated locations and arrangements are used to size pipe and calculate friction loss, expansion, and other design considerations. Install piping as indicated unless deviations to layout are approved on Coordination Drawings.
      3. Arrange for pipe spaces, chases, slots, sleeves, and openings in building structure during progress of construction, to allow for mechanical installations.
      4. Install piping in concealed locations unless otherwise indicated and except in equipment rooms and service areas.
      5. Install piping indicated to be exposed and piping in equipment rooms and service areas at right angles or parallel to building walls. Diagonal runs are prohibited unless specifically indicated otherwise.
      6. Install piping above accessible ceilings to allow sufficient space for ceiling panel removal.
      7. Locate valves for easy access.
      8. Install natural-gas piping at uniform grade of 2 percent down toward drip and sediment traps.
      9. Install piping free of sags and bends.
      10. Install fittings for changes in direction and branch connections.
      11. Fire-Barrier Penetrations: Maintain indicated fire rating of walls, partitions, ceilings, and floors at pipe penetrations. Seal pipe penetrations with firestop materials. Comply with requirements in Division 07 Section "Penetration Firestopping."
      12. Verify final equipment locations for roughing-in.
      13. Comply with requirements in Sections specifying gas-fired appliances and equipment for roughing-in requirements.
      14. Drips and Sediment Traps: Install drips at points where condensate may collect, including service-meter outlets. Locate where accessible to permit cleaning and emptying. Do not install where condensate is subject to freezing.
          1. Construct drips and sediment traps using tee fitting with bottom outlet plugged or capped. Use nipple a minimum length of 3 pipe diameters, but not less than 3 inches long and same size as connected pipe. Install with space below bottom of drip to remove plug or cap.
      15. Extend relief vent connections for service regulators, line regulators, and overpressure protection devices to outdoors and terminate with weatherproof vent cap.
      16. 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.
      17. Use eccentric reducer fittings to make reductions in pipe sizes. Install fittings with level side down.
      18. Connect branch piping from top or side of horizontal piping.
      19. Install unions in pipes NPS 2 and smaller, adjacent to each valve, at final connection to each piece of equipment.
      20. Do not use natural-gas piping as grounding electrode.
      21. Install strainer on inlet of each line-pressure regulator and automatic or electrically operated valve.
   3. VALVE INSTALLATION
      1. Install manual gas shutoff valve for each gas appliance ahead of corrugated stainless-steel tubing or copper connector.
      2. Install underground valves with valve boxes.
      3. Install regulators and overpressure protection devices with maintenance access space adequate for servicing and testing.
      4. Install earthquake valves aboveground outside buildings according to listing.
      5. Install anode for metallic valves in underground PE piping.
   4. PIPING JOINT CONSTRUCTION
      1. Ream ends of pipes and tubes and remove burrs.
      2. Remove scale, slag, dirt, and debris from inside and outside of pipe and fittings before assembly.
      3. Threaded Joints:
         1. Thread pipe with tapered pipe threads complying with ASME B1.20.1.
         2. Cut threads full and clean using sharp dies.
         3. Ream threaded pipe ends to remove burrs and restore full inside diameter of pipe.
         4. Apply appropriate tape or thread compound to external pipe threads unless dryseal threading is specified.
         5. Damaged Threads: Do not use pipe or pipe fittings with threads that are corroded or damaged. Do not use pipe sections that have cracked or open welds.
      4. Welded Joints:
         1. Construct joints according to AWS D10.12/D10.12M, using qualified processes and welding operators.
         2. Bevel plain ends of steel pipe.
         3. Patch factory-applied protective coating as recommended by manufacturer at field welds and where damage to coating occurs during construction.
      5. Brazed Joints: Construct joints according to AWS's "Brazing Handbook," "Pipe and Tube" Chapter.
      6. Flared Joints: Cut tubing with roll cutting tool. Flare tube end with tool to result in flare dimensions complying with SAE J513. Tighten finger tight, then use wrench. Do not overtighten.
      7. PE Piping Heat-Fusion Joints: Clean and dry joining surfaces by wiping with clean cloth or paper towels. Join according to ASTM D 2657.
         1. Plain-End Pipe and Fittings: Use butt fusion.
         2. Plain-End Pipe and Socket Fittings: Use socket fusion.
   5. HANGER AND SUPPORT INSTALLATION
      1. 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.
      2. Install hangers for horizontal, corrugated stainless-steel tubing with the following maximum spacing and minimum rod sizes:
         1. NPS 3/8: Maximum span, 48 inches; minimum rod size, 3/8 inch.
         2. NPS 1/2: Maximum span, 72 inches; minimum rod size, 3/8 inch.
         3. NPS 3/4 and Larger: Maximum span, 96 inches; minimum rod size, 3/8 inch.
   6. CONNECTIONS
      1. Connect to utility's gas main according to utility's procedures and requirements.
      2. Install natural-gas piping electrically continuous, and bonded to gas appliance equipment grounding conductor of the circuit powering the appliance according to NFPA 70.
      3. Install piping adjacent to appliances to allow service and maintenance of appliances.
      4. Connect piping to appliances using manual gas shutoff valves and unions. Install valve within 72 inches of each gas-fired appliance and equipment. Install union between valve and appliances or equipment.
      5. Sediment Traps: Install tee fitting with capped nipple in bottom to form drip, as close as practical to inlet of each appliance.
   7. LABELING AND IDENTIFYING
      1. Comply with requirements in Division 23 Section "Identification for HVAC Piping and Equipment" for piping and valve identification. Install detectable warning tape directly above gas piping, 12 inches below finished grade, except 6 inches below subgrade under pavements and slabs.
   8. FIELD QUALITY CONTROL
      1. Test, inspect, and purge natural gas according to NFPA 54, the International Fuel Gas Code and authorities having jurisdiction.
      2. Natural-gas piping will be considered defective if it does not pass tests and inspections.
      3. Prepare test and inspection reports.
   9. OUTDOOR PIPING SCHEDULE
      1. Underground natural-gas piping shall be[ one of] the following:
         1. PE pipe and fittings joined by heat fusion; service-line risers with tracer wire terminated in an accessible location.
         2. Steel pipe with wrought-steel fittings and welded joints. Coat pipe and fittings with protective coating for steel piping.
      2. Aboveground natural-gas piping shall be[ one of] the following:
         1. Steel pipe with malleable-iron fittings and threaded joints.
         2. Steel pipe with wrought-steel fittings and welded joints.
      3. Containment Conduit: Steel pipe with wrought-steel fittings and welded joints. Coat pipe and fittings with protective coating for steel piping.
   10. INDOOR PIPING SCHEDULE
       1. Aboveground, distribution piping shall be one of the following:
          1. Steel pipe with malleable-iron fittings and threaded joints.
          2. Steel pipe with wrought-steel fittings and welded joints.
       2. Underground, below building, piping shall be one of the following:
          1. Steel pipe with malleable-iron fittings and threaded joints.
          2. Steel pipe with wrought-steel fittings and welded joints.
       3. Containment Conduit: Steel pipe with wrought-steel fittings and welded joints. Coat pipe and fittings with protective coating for steel piping.
       4. Containment Conduit Vent Piping: Steel pipe with malleable-iron fittings and threaded or wrought-steel fittings with welded joints. Coat underground pipe and fittings with protective coating for steel piping.
   11. ABOVEGROUND MANUAL GAS SHUTOFF VALVE SCHEDULE
       1. Valves for pipe sizes NPS 2 and smaller at service meter shall be[ one of] the following:
          1. One-piece, bronze ball valve with bronze trim.
          2. Two-piece, full-port, bronze ball valves with bronze trim.
          3. Bronze plug valve.
       2. Distribution piping valves for pipe sizes NPS 2 and smaller shall be one of the following:
          1. One-piece, bronze ball valve with bronze trim.
          2. Two-piece, full-port, bronze ball valves with bronze trim.
          3. Bronze plug valve.
       3. Valves in branch piping for single appliance shall be one of the following:
          1. One-piece, bronze ball valve with bronze trim.
          2. Two-piece, full-port, bronze ball valves with bronze trim.
          3. Bronze plug valve.

END OF SECTION

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