SECTION 15211 - GENERAL-SERVICE COMPRESSED-AIR 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 piping and related specialties for general-service compressed-air systems operating at 200 psig and less.

B. Related Sections include the following:

1. Division 15 Section "Meters and Gages" for thermometers and pressure gages.

1.3 DEFINITIONS

A. ABS: Acrylonitrile-butadiene-styrene plastic.

B. CR: Chlorosulfonated polyethylene synthetic rubber.

C. EPDM: Ethylene-propylene-diene terpolymer rubber.

D. FPM: Vinylidene fluoride-hexafluoropropylene copolymer rubber.

E. HDPE: High-density polyethylene plastic.

F. High-Pressure Compressed-Air Piping: System of compressed-air piping and specialties operating at pressures between 125 and 200 psig.

G. Low-Pressure Compressed-Air Piping: System of compressed-air piping and specialties operating at pressures of 125 psig and less.

H. NBR: Acrylonitrile-butadiene rubber.

I. PE: Polyethylene plastic.

1.4 SUBMITTALS

A. Product Data: For the following:

1. Pipes, tubes, and fittings.
2. Safety valves.
3. Pressure regulators.

B. Coordination Drawings: For general-service compressed-air systems. Include relationship to other services that serve same work area.

C. Brazing Certificates: As required by ASME Boiler and Pressure Vessel Code, Section IX, or AWS B2.2.

D. Field quality-control test reports.

1.5 QUALITY ASSURANCE

A. Brazing: Qualify processes and operators according to ASME Boiler and Pressure Vessel Code: Section IX, "Welding and Brazing Qualifications," or AWS B2.2, "Standard for Brazing Procedure and Performance Qualification."

B. Welding: Qualify processes and operators according to ASME Boiler and Pressure Vessel Code: Section IX, "Welding and Brazing Qualifications."

C. Comply with ASME B31.1, "Power Piping," for high-pressure compressed-air piping.

D. Comply with ASME B31.9, "Building Services Piping," for low-pressure compressed-air piping.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. In other Part 2 articles where titles below introduce lists, the following requirements apply for 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, the manufacturers specified.
2. Manufacturers: Subject to compliance with requirements, provide products by 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, AND FITTINGS

A. Copper Tube: ASTM B 88, Type K or L, seamless, drawn-temper, water tube. Provide Type K if indicated.

1. Wrought-Copper Fittings: ASME B16.22, solder-joint pressure type or MSS SP-73, wrought copper with dimensions for brazed joints.
2. Cast-Copper-Alloy Flanges: ASME B16.24, Class 150 or 300. Provide Class 300 if indicated.
3. Copper Unions: ASME B16.22 or MSS SP-123.

B. Transition Couplings for Metal Piping: Metal coupling or other manufactured fitting same size as, with pressure rating at least equal to and ends compatible with, piping to be joined.

2.4 JOINING MATERIALS

A. Refer to Division 15 Section "Basic Mechanical Materials and Methods" for joining materials not in this Section.

2.5 VALVES

A. General-Duty Valves: Refer to Division 15 Section "Valves" for metal ball and general-duty valves.

2.6 SPECIALTIES

A. Safety Valves: ASME Boiler and Pressure Vessel Code: Section VIII, "Pressure Vessels," construction; National Board certified, labeled, and factory sealed; constructed of bronze body with poppet safety valve for compressed-air service.

1. Pressure Settings: Higher than discharge pressure and same or lower than receiver pressure rating.

B. Air-Line Pressure Regulators: Bronze body, direct acting, spring-loaded manual pressure-setting adjustment, and rated for 200-psig inlet pressure, unless otherwise indicated.

1. Type: Diaphragm operated.

PART 3 - EXECUTION

3.1 PREPARATION

A. Interruption of Existing Compressed-Air Service: Do not interrupt compressed-air service to facilities occupied by Owner or others unless permitted under the following conditions and then only after arranging to provide temporary compressed-air service according to requirements indicated:

1. Notify Construction Manager and Owner not less than two days in advance of proposed interruption of compressed-air service.
2. Do not proceed with interruption of compressed-air service without Construction Manager's and Owner's written permission.

3.2 PIPING APPLICATIONS

A. Install nipples, flanges, unions, transition and special fittings, and valves with pressure ratings same as or higher than system pressure rating used in applications below, unless otherwise indicated.

B. Joining of Dissimilar Metal Piping: Use dielectric fittings. Refer to Division 15 Section "Basic Mechanical Materials and Methods" for dielectric fitting types.

1. NPS 2 and Smaller: Dielectric unions.
2. NPS 2-1/2 to NPS 4: Dielectric flanges.

C. Specialty and Equipment Flanged Connections: Use cast-copper-alloy companion flange with gasket and brazed joint for connection to copper tube.

D. Low-Pressure Compressed-Air Distribution Piping: Use the following piping materials for each size range:

1. NPS 2 and Smaller: Copper tube, wrought-copper fittings, and brazed joints.
2. NPS 2-1/2 to NPS 4: Copper tube, wrought-copper fittings, and brazed joints.

3.3 VALVE APPLICATIONS

A. General-Duty Valves: Refer to Division 15 Section "Valves" for metal general-duty valves. Use metal valves, unless otherwise indicated.

1. Metal General-Duty Valves: Use valve types specified in "Valve Applications" Article in Division 15 Section "Valves" according to the following:

a) Low-Pressure Compressed Air: Valve types specified for low-pressure compressed air.

b) This Section uses the term "high-pressure compressed air" for the category that was called "medium-pressure compressed air" in previous editions. Both categories cover compressed-air systems operating between 125 and 200 psig. No change to Section Text is required.

c) High-Pressure Compressed Air: Valve types specified for medium-pressure compressed air.

d) Equipment Isolation NPS 2 and Smaller: Safety-exhaust copper-alloy ball valve with exhaust vent and pressure rating at least as great as piping system operating pressure.

3.4 PIPING INSTALLATION

A. Refer to Division 15 Section "Basic Mechanical Materials and Methods" for basic piping installation.

B. Install air and drain piping with 1 percent slope downward in direction of airflow.

C. Install eccentric reducers where piping is reduced in direction of flow, with bottoms of both pipes and reducer fitting flush.

D. Install branch connections to compressed-air mains from top of main. Provide drain leg and drain trap at end of each main and branch and at low points.

E. Install pipe expansion joints and anchors according to Division 15 Section "Pipe Expansion Fittings and Loops."

3.5 VALVE INSTALLATION

A. Refer to Division 15 Section "Basic Mechanical Materials and Methods" for basic piping and valve installation.

B. Install metal general-duty valves according to Division 15 Section "Valves."

C. Install shutoff valve at each connection to and from general-service compressed-air specialties, equipment, and accessories. Install strainer if indicated.

D. Install check valves to maintain correct direction of fluid flow to and from compressed-air piping specialties and equipment.

E. Install safety valves where recommended by specialty manufacturers.

3.6 JOINT CONSTRUCTION

A. Refer to Division 15 Section "Basic Mechanical Materials and Methods" for basic piping joint construction.

B. Join copper tubing with brazed joints. Use silver-composition or copper-phosphorus-composition filler metal and comply with CDA's "Copper Tube Handbook," Section VII, "Brazed Joints."

C. Dissimilar Metal Piping Material Joints: Use dielectric fittings.

3.7 HANGER AND SUPPORT INSTALLATION

A. Refer to Division 15 Section "Hangers and Supports" for pipe hanger and support devices. Install the following:

1. Vertical Piping: MSS Type 8 or 42, clamps.
2. Individual, Straight, Horizontal Piping Runs: According to the following:
   a) 100 Feet and Less: MSS Type 1, adjustable, steel, clevis hangers.
   b) Longer Than 100 Feet: MSS Type 43, adjustable, roller hangers.
   c) Longer Than 100 Feet, if Indicated: MSS Type 49, spring cushion rolls.

B. Install supports according to Division 15 Section "Hangers and Supports."

C. Support horizontal piping within **12 inches** of each fitting and coupling.

D. Support vertical piping and tubing at base and at each floor.

E. Rod diameter may be reduced 1 size for double-rod hangers, with 3/8-inch minimum rods.

F. Install hangers for copper tubing with the following maximum horizontal spacing and minimum rod diameters:

1. NPS 1: 96 inches with 3/8-inchrod.
2. NPS 1-1/4: 108 inches with 3/8-inchrod.
3. NPS 1-1/2: 10 feet with 3/8-inchrod.
4. NPS 2: 11 feet with 3/8-inchrod.
5. NPS 2-1/2: 13 feet with 1/2-inchrod.

G. Install supports for vertical copper tubing every 10 feet.

3.8 CONNECTIONS

A. Drawings indicate general arrangement of piping, fittings, and specialties.

B. Install piping adjacent to specialties and equipment to allow service and maintenance.

C. Connect piping to air compressors, accessories, and specialties with shutoff valve and union or flanged connection.

3.9 LABELING AND IDENTIFICATION

A. Install identifying labels and devices for general-service compressed-air piping systems.

3.10 FIELD QUALITY CONTROL

A. Perform the following field tests and inspections and prepare test reports:

1. Test and adjust piping safety controls. Replace damaged and malfunctioning safety controls.
2. Piping Leak Tests: Test new and modified parts of existing piping. Cap and fill general-service compressed-air piping with oil-free dry air or gaseous nitrogen to pressure of 50 psig above system operating pressure, but not less than **150 psig**. Isolate test source and let stand for four hours to equalize temperature. Refill system, if required, to test pressure; hold for two hours with no drop in pressure.
   a) Repair leaks and retest until no leaks exist.
3. Report results in writing.

END OF SECTION 15211