

SECTION 336012 – PIPING FOR UTILITY DISTRIBUTION

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification sections, apply to this section.

1.2 SUMMARY

- A. Provide all labor, materials, and equipment as necessary to complete all work as indicated on the Drawings and as specified herein.
- B. Section Includes: Furnishing and installation of pipes, tubes, and fittings.
- C. Related sections:
 - 1. Division 33 Section “Utility Distribution General Requirements.”
 - 2. Division 33 Section “Piping Specialties for Steam Utility Distribution.”
 - 3. Division 33 Section “Steam and Condensate Utility Distribution.”

1.3 REFERENCES

- A. ANSI/ASME Standards:
 - 1. B16.3 - Malleable Iron Threaded Fittings.
 - 2. B16.5 - Pipe Flanges and Flanged Fittings.
 - 3. B16.9 - Factory-Made Wrought Steel Butt Welding Fittings.
 - 4. B31.1 - Power Piping.
- B. ASTM Standards:
 - 1. A47 - Ferritic Malleable Iron Castings.
 - 2. A53 - Pipe, Steel, Black and Hot-Dipped, Zinc-Coated, Welded and Seamless.
 - 3. A105 - Forgings, Carbon Steel, for Piping Components.
 - 4. A106 - Specification for Seamless Carbon Steel Pipe for High Temperature Service.
 - 5. A126 - Gray Iron Castings for Valves, Flanges, and Pipe Fittings.
 - 6. A181 - Forgings, Carbon Steel, for General Purpose Piping.
 - 7. A182 - Forged or Rolled Alloy-Steel Pipe Flanges, Forged Fittings, and Valves and Parts for High Temperature Service.
 - 8. A197 - Cupola Malleable Iron.

9. A234 - Pipe Fittings for Wrought Carbon Steel and Alloy Steel for Moderate and Elevated Temperatures.
10. A312 - Seamless and Welded Austenitic Stainless Steel Pipes.
11. A376 - Seamless Austenitic Steel Pipe for High Temperature Central Station Service.
12. A403 - Wrought Austenitic Stainless Steel Piping Fittings.
13. A536 - Ductile Iron Castings:
14. B6 – Zinc.
15. B88 - Seamless Copper Water Tube.

C. ANSI/AWWA Standards:

1. C110/A21.10 - Ductile-Iron and Gray-Iron Fittings.
2. C111/A21.11 - Rubber Gasket Joints for Ductile Iron and Gray-Iron Pressure Pipe and Fittings.
3. C151/A21.51 - Ductile-Iron Pipe, Centrifugally Cast.
4. Michigan Boiler Code.
5. Pipe Fabrication Institute: Standard ES-3 – Fabricating Tolerances.

1.4 1.4 QUALITY ASSURANCE

A. Fabrication and Installation Personnel Qualifications:

1. Trained and experienced in the fabrication and installation of the materials and equipment.
2. Knowledgeable of the design and the reviewed Shop Drawings.

B. Labeling:

1. Piping materials shall bear the label, stamp or other marking of all specified standards and testing compliance.
2. Imported pipe must be labeled in accordance with Section 304 of the Tariff Act of 1930, as amended (19 U. S. C. 1304). This rule provides that, unless excepted, every article of foreign origin imported into U.S. shall be marked in a conspicuous place as legibly, indelibly, and permanently as the nature of the article (or container) will permit, in such a manner as to indicate to the ultimate purchaser in the U.S. the English name of the country of origin of the article.

- C. Testing of Steel Piping: In accordance with Division 33 Section “Steam and Condensate Utility Distribution.”

PART 2 - PRODUCTS

2.1 BLACK STEEL PIPE

- A. Black steel pipe shall be welded and seamless carbon steel, and scheduled as specified for the type of service.
- B. Welded black steel pipe shall meet the requirements of ASTM A 53 or A 106, and shall be type E-electric resistance welded (ERW) Grade B.
- C. Seamless black steel pipe shall meet the requirements of ASTM A53 or ASTM A 106, Type S-Seamless, Grade A or B.

2.2 GALVANIZED STEEL PIPE

- A. Galvanized steel pipe shall be hot-dipped galvanized on inside and outside surfaces and shall meet the requirements of ASTM A 53.
- B. Zinc used in galvanizing shall meet the requirements of ASTM B6 and shall be applied using 2 ounces of zinc per square foot of coated surface.

2.3 THREADED FITTINGS AND FLANGES

- A. Threaded fittings shall be cast or malleable iron, galvanized or black, as specified for the type of service. Fittings shall be rated for the pressures and temperatures of the intended application.
- B. Malleable iron threaded fittings shall be heavy weight, Class 300 for steam utility distribution; and shall conform to ANSI/ASME B16.3. Malleable iron, used in fittings, shall meet the requirements of ASTM A197.
- C. Flanges for screwed piping shall be Class 150, threaded pattern and ductile iron for steam utility distribution; and galvanized when used with galvanized piping. Drilling and outside diameter of flanges shall match ANSI/ASME B16.1. Cast iron, used in flanges, shall conform to ASTM A126.
- D. Unions shall have brass to iron, ground joint seat.
 - 1. Properly fitted for design temperature and pressure.
 - 2. 2,000 pound rated equal to Crane No. 250H or 251H.
 - 3. 3,000 pound rated equal to Crane No. 252H.
- E. Acceptable manufacturers are Anvil and Ward; or equal.

2.4 WELDING FITTINGS AND FLANGES

- A. Welding fittings and flanges shall be of forged steel, 150 pound standard, and permanently marked with the manufacturer's trade-mark, heat code, nominal size, pipe weight, and material grade.
- B. Welding fittings shall meet the requirements of ASTM A234 and ASME SA 234 WPB and their dimensions shall conform to ANSI/ASME B16.9 and/or B16.28 including permanent marking requirements of MSS SP-25.
- C. Welding flanges shall meet the requirements of ASTM A181, Grade 1 for steam utility distribution and their dimensions shall conform to ANSI/ASME B16.5 including permanent marking requirements of MSS SP-25. Flanges shall be of the welding neck type and shall be faced true and placed perpendicular to the axis of the pipe.
- D. Branch tee connections shall be made using forged weld end tees or forged Boss' welding fittings for steam utility distribution. Forged Boss' shall be 1-1/2-inch maximum hole size. Where the pipe size of a branch is the same or one size less the size of the run, a welding tee shall be used.
- E. Acceptable Manufacturers: Weldbend, Ladish, Bonney Forge, Allied or approved equal.

2.5 JOINING MATERIALS

- A. Gaskets:
 - 1. Suitable for chemical and thermal conditions of piping system contents.
 - 2. High Pressure Steam Piping: Flexitallic spiral wound gaskets Class 150, ASME B16.20 with 304 SS metal winding strip and Flexicarb flexible graphite filler material; or approved equal.
 - 3. Low Pressure Steam and Condensate Return Piping: Flexitallic spiral wound gaskets Class 150, ASME B16.20 with 304 SS metal winding strip and Flexicarb flexible graphite filler material; Graphonic corrugated metal gaskets Class 150 with 316 SS core and flexible graphite sealing element; or approved equal.
- B. Anti-Seize compound, if required, shall be Loctite C5-A Copper Based; or approved equal.
- C. All purpose PTFE soft-set thread sealing compound. Jomar Gimmie The White Stuff, Rectorseal No. 5; or approved equal.
- D. Flange Bolts and Nuts: Unless required otherwise, conform to ASTM A-354 Grade BD and SAE J-429 Grade 8 for steam and condensate application.

2.6 DUCTILE IRON PIPE AND FITTINGS

- A. Push-on joint or mechanical joint ductile iron pipe shall be manufactured in accordance with the requirements of ANSI/AWWA C151/A21.51 and C111/A21.11.
- B. Pipe 12" in size and smaller shall have a minimum wall thickness of ANSI Class 53.

- C. Pipe and fittings shall be furnished with a cement mortar lining conforming to ANSI/AWWA C104/A21.4, and coated inside and outside with coal tar dip coating. Underground pipe shall be encased with polyethylene in accordance with ANSI/AWWA C105/A21.5.
- D. Mechanical joint fittings shall meet the requirements of ANSI/AWWA C110/A21.10 and ANSI/AWWA C111/A21.11.
- E. Acceptable Manufacturers: Clow Water Systems Co. and Union Foundry Co., divisions of McWane Inc., or approved equal.

2.7 STAINLESS STEEL PIPE AND FITTINGS

- A. Stainless steel pipes 2" in size and smaller shall meet the requirements of ASTM A312 or A376, Schedule 40, seamless, type 304 pipe with ASTM A182, Gr. F304, 300 lb socket-weld fittings.
- B. Stainless steel pipes 2-1/2" in size and larger shall meet the requirements of ASTM A312 or A376, Schedule 40, seamless, type 304 pipe with ASTM A403, Gr. WP304, butt-weld fittings.
- C. Use 300 lb socket-weld, stainless steel ground joint unions.
- D. Use ASTM A182, Gr. F304, 150 lb flanges with 1/16" raised face, serrated face finish and weld neck pattern.

PART 3 - EXECUTION

3.1 GENERAL

- A. Refer to individual piping system Specification sections for specific requirements.
- B. Piping shall be run parallel or at right angle to walls in the most direct and straight manner possible. Diagonal runs are not permitted unless expressly indicated on the Drawings. Piping shall be properly graded.
- C. Offset piping where required to avoid interferences with other work or to provide greater headroom or clearance.
- D. Install piping such that equipment connected to piping may be removed by disconnecting two (2) flanges or unions and removing only one or two pipe sections.
- E. Use fittings for changes in direction and branch connections. T-drill system for mechanically formed tee connections and couplings. Victaulic hole cut piping system is not allowed.
- F. Fabrication shall comply with dimensional tolerances in accordance with PF1 Standard ES-3.

3.2 PIPE CUTTING

- A. Cut ends of pipe square. After cutting, ream out pipe to full bore and thoroughly clean to remove cuttings and foreign material.

3.3 PIPE CONNECTIONS

- A. Unions or flanges shall be used at final connections and at connections to fixtures, pumps, equipment and control valves. Unions shall be used for pipes 2" in size and smaller connections, and flanges for pipes 2-1/2" in size and larger.
- B. Unions shall be used in preference to couplings where their use will facilitate dismantling the pipe for maintenance.
- C. Pipe sizes indicated shall be carried full size to equipment served. Changes of size to match equipment connection shall be made within one foot of the equipment. At pressure reducing valves with sizes smaller than connected lines, reduction shall be made immediately adjacent to valves.
- D. No Uni-flange pipe adapters will be allowed.
- E. Flanged Connections:
 - 1. Align flange surfaces parallel.
 - 2. Assemble Joints by sequencing bolt tightening to make initial contact of flanges and gaskets as flat and parallel as possible. Use suitable lubricants on bolt threads including anti-seize compound on bolts. Anti-seize compound shall be rated for temperatures to 600 degrees F. Tighten bolts gradually and uniformly with a torque wrench.
 - 3. Provide documentation of torque testing of all bolts on high pressure steam.
 - 4. In cases where higher rated steel raised face flanges mate to lower rated cast iron flat face flanges, remove raised face from steel flange before bolting together.
 - 5. Unless required otherwise, piping flange bolting shall conform to ASTM A354 Grade BD and SAE J-429 Grade 8 for steam and condensate application.

3.4 WELDING STEEL PIPE

- A. All welding shall be done in accordance with the ANSI B-31.1 and the ASME welding code.
- B. Pipe ends on welded pipe lines shall be suitably beveled to permit butt-welding.
- C. Welds shall be of sound metal thoroughly fused to the base metal and penetrating to the bottom of the joints.
- D. Use welding bends in changing pipe directions. Mitered joints will not be accepted.
- E. Welders shall be experienced in the type of work to be done. Welders who, in the opinion of the Project Representative are not competent to perform the work required, shall be dismissed from the job. At no time shall a welder not approved by the Project Representative be allowed to weld pipe on the Project.
- F. Welders shall be certified under the procedure of the ANSI B-31.1 and the ASME Welding Code, Section 9, for the thickness and type of piping they work on. Tests shall be conducted by

Hartford Insurance Co., or equivalent certifying agency. The Engineer shall be sent a copy of the certification of welders employed on the Project.

3.5 ECCENTRIC COUPLINGS

- A. Eccentric reducing couplings shall be provided in all cases where air or water pockets would otherwise occur due to a reduction in pipe size.
- B. Eccentric couplings shall make the pipe flush on the bottom for steam lines and flush on the top for water lines.

3.6 PIPE PROTECTION

- A. During construction cap and plug openings in pipes with suitable metal plugs or cap to keep out dirt and rubbish until equipment is connected.

3.7 PIPE SLEEVES

- A. Provide steel pipe sleeves for pipes wherever they pass through building construction or vault walls, and elsewhere as specified or indicated on the Drawings.
- B. Where sleeves pass through reinforced concrete floors, they shall be properly set in position before the concrete is poured, and shall be maintained in position by the Contractor until the concrete is set.

3.8 WALL SEALS

- A. Pipes passing through below grade perimeter walls shall have the space between the pipe and sleeve sealed watertight with a mechanical seal. Refer to Division 33 Section "Piping Specialties for Utility Distribution" for requirements.

END OF SECTION 336012