SECTION 23 21 13 - HYDRONIC PIPING

PART 1 GENERAL

1.01 REFERENCE STANDARDS

A. ASME BPVC-IX - Boiler and Pressure Vessel Code, Section IX - Welding, Brazing, and Fusing Procedures; Welders; Brazers; and Welding, Brazing and Fusing Operators 2019.


C. ASME B16.18 - Cast Copper Alloy Solder Joint Pressure Fittings 2018.


Q. AWS A5.8M/A5.8 - Specification for Filler Metals for Brazing and Braze Welding 2011 (Amended 2012).
W. AWWA C606 - Grooved and Shouldered Joints 2015.

1.02 QUALITY ASSURANCE
A. Date stamp all castings used for coupling housings, fittings, valve bodies, etc. for quality assurance and traceability.
B. Welder Qualifications: Certify in accordance with ASME BPVC-IX.

PART 2 PRODUCTS

2.01 HYDRONIC SYSTEM REQUIREMENTS
A. Comply with ASME B31.9 and applicable federal, state, and local regulations.
B. Piping: Provide piping, fittings, hangers and supports as required, as indicated, and as follows:
   1. Where more than one piping system material is specified, provide joining fittings that are compatible with piping materials and ensure that the integrity of the system is not jeopardized.
   2. Use non-conducting dielectric connections whenever jointing dissimilar metals.
   3. Grooved mechanical joints may be used in accessible locations only.
      a. Accessible locations include those exposed on interior of building, in pipe chases, and in mechanical rooms, aboveground outdoors, and as approved by Architect.
      b. Use rigid joints unless otherwise indicated.
   4. Provide pipe hangers and supports in accordance with ASME B31.9 or MSS SP-58 unless indicated otherwise.
C. Pipe-to-Valve and Pipe-to-Equipment Connections: Use flanges, unions or grooved couplings to allow disconnection of components for servicing; do not use direct welded, soldered, or threaded connections.

D. Valves: Provide valves where indicated:

E. Welding Materials and Procedures: Conform to ASME BPVC-IX.

2.02 HEATING WATER AND GLYCOL PIPING, BURIED

A. Steel Pipe: ASTM A53/A53M, Schedule 40, black, with AWWA C105/A21.5 polyethylene jacket, or double layer, half-lapped polyethylene tape.

B. Steel Pipe Sizes 12 inch (305 mm) and Greater: ASTM A53/A53M, 3/8 inch (9.5 mm) wall, black with AWWA C105/A21.5 polyethylene jacket, or double layer, half-lapped polyethylene tape.

1. Fittings: ASTM A234/A234M, wrought steel welding type with double layer, half-lapped polyethylene tape.

2. Joints: Welded in accordance with AWS D1.1/D1.1M.

3. Casing: Closed glass cell insulation.

C. Copper Tube: ASTM B88 (ASTM B88M), Type K (A), annealed.


2. Joints: Braze, AWS A5.8M/A5.8 BCuP copper/silver alloy.

3. Casing: Closed glass cell insulation.

2.03 HEATING WATER AND GLYCOL PIPING, ABOVE GRADE

A. Steel Pipe: ASTM A53/A53M, Schedule 40, black, using one of the following joint types:


B. Steel Pipe Sizes 12 Inch (305 mm) and Greater: ASTM A53/A53M, 3/8 inch (9.5 mm) wall, black, using one of the following joint types:

2. Grooved Joints: AWWA C606 grooved pipe, fittings of same material, and mechanical couplings.

C. Copper Tube: ASTM B88 (ASTM B88M), Type K (A), drawn, using one of the following joint types:
      a. Solder: ASTM B32 lead-free solder, HB alloy (95-5 tin-antimony) or tin and silver.
      b. Braze: AWS A5.8M/A5.8 BCuP copper/silver alloy.
   2. Grooved Joints: AWWA C606 grooved tube, fittings of same material, and copper-tube-dimension mechanical couplings.
   3. Tee Connections: Mechanically extracted collars with notched and dimpled branch tube.

2.04 CHILLED WATER PIPING, BURIED

A. Steel Pipe: ASTM A53/A53M, Schedule 40, black with AWWA C105/A21.5 polyethylene jacket, or double layer, half-lapped polyethylene tape.
   1. Fittings: ASTM A234/A234M, wrought steel welding type with double layer, half-lapped polyethylene tape.
   2. Joints: Welded in accordance with AWS D1.1/D1.1M.
   3. Casing: Closed glass cell insulation.

B. Steel Pipe Sizes 12 Inch (305 mm) and Greater: ASTM A53/A53M, 3/8 inch (9.5 mm) wall, black with AWWA C105/A21.5 polyethylene jacket, or double layer, half-lapped polyethylene tape.
   1. Fittings: ASTM A234/A234M, wrought steel welding type with double layer, half-lapped polyethylene tape.
   2. Joints: Welded in accordance with AWS D1.1/D1.1M.
   3. Casing: Closed glass cell insulation.

C. Copper Tube: ASTM B88 (ASTM B88M), Type K (A) annealed.
   2. Joints: Solder, lead free, ASTM B32 HB alloy (95-5 tin-antimony), or tin and silver.
   3. Casing: Closed glass cell insulation.

2. Joints: AWWA C111/A21.11, Styrene butadiene rubber (SBR) or vulcanized SBR gasket with 3/4 inch (19 mm) diameter rods.

E. PVC Pipe Sizes 6 inch (150 mm) and Smaller: ASTM D1785, Schedule 40, or ASTM D2241, SDR 21 or 26.
   1. Fittings: ASTM D2466, or ASTM D2467, PVC.
   2. Joints: Solvent welded in accordance with ASTM D2855.

F. PVC Pipe Sizes 8 Inch (200 mm) and Larger: ASTM D1785, Schedule 80, or ASTM D2241, SDR 21 or 26.
   1. Fittings: ASTM D2466, or ASTM D2467, PVC.
   2. Joints: Solvent welded in accordance with ASTM D2855.

2.05 CHILLED WATER PIPING, ABOVE GRADE

A. Steel Pipe: ASTM A53/A53M, Schedule 40, black; using one of the following joint types:

B. Steel Pipe Sizes 12 Inch (305 mm) and Greater: ASTM A53/A53M, 3/8 inch (9.5 mm) wall, black; using one of the following joint types:
   2. Grooved Joints: AWWA C606 grooved pipe, fittings of same material, and mechanical couplings.

C. Copper Tube: ASTM B88 (ASTM B88M), Type K (A), hard drawn; using one of the following joint types:
      a. Solder: ASTM B32 lead-free solder, HB alloy (95-5 tin-antimony) or tin and silver.
   2. Grooved Joints: AWWA C606 grooved tube, fittings of same material, and copper-tube-dimension mechanical couplings.
3. Tee Connections: Mechanically extracted collars with notched and dimpled branch tube.

D. PVC Pipe: ASTM D1785, Schedule 40, or ASTM D2241, SDR 21 or 26.
   1. Fittings: ASTM D2466 or ASTM D2467, PVC.
   2. Joints: Solvent welded in accordance with ASTM D2855.

E. PVC Pipe Sizes 8 Inch (203 mm) and Larger: ASTM D1785, Schedule 80, or ASTM D2241, SDR 21 or 26.
   1. Fittings: ASTM D2466 or ASTM D2467, PVC.
   2. Joints: Solvent welded in accordance with ASTM D2855.

2.06 CONDENSER WATER PIPING, BURIED

A. Steel Pipe: ASTM A53/A53M, Schedule 40, black with AWWA C105/A21.5 polyethylene jacket, or double layer, half-lapped polyethylene tape.
   1. Fittings: ASTM A234/A234M, wrought steel welding type with double layer, half-lapped polyethylene tape.
   2. Joints: Threaded for pipe 2 inch (50 mm) and under; AWS D1.1/D1.1M, welded for pipe over 2 inch (50 mm).

B. Steel Pipe Sizes 12 Inch (305 mm) and Greater: ASTM A53/A53M, 3/8 inch (9.5 mm) wall, black with AWWA C105/A21.5 polyethylene jacket, or double layer, half-lapped polyethylene tape.
   1. Fittings: ASTM A234/A234M, wrought steel welding type with double layer, half-lapped polyethylene tape.
   2. Joints: Welded in accordance with AWS D1.1/D1.1M.

C. Copper Tube: ASTM B88 (ASTM B88M), Type K (A) annealed.
   2. Joints: Solder, lead free, 95-5 tin-antimony, or tin and silver.


E. PVC Pipe: ASTM D1785, Schedule 40, or ASTM D2241, SDR 21 or 26.
   1. Fittings: ASTM D2466 or ASTM D2467, PVC.
   2. Joints: Solvent welded in accordance with ASTM 2855.

F. PVC Pipe sizes 8 inch (200 mm) and larger: ASTM D1785, Schedule 80, or ASTM D2241, SDR 21 or 26.
   1. Fittings: ASTM D2466 or ASTM D2467, PVC.
2. Joints: Solvent welded in accordance with ASTM D2855.

2.07 CONDENSER WATER PIPING, ABOVE GRADE

A. Steel Pipe: ASTM A53/A53M, Schedule 40, black.

B. Steel Pipe Sizes 12 Inch (305 mm) and Greater: ASTM A53/A53M, 3/8 inch (9.5 mm) wall, black; using one of the following joint types:
   2. Grooved Joints: AWWA C606 grooved pipe, fittings of same material, and mechanical couplings.

C. Copper Tube: ASTM B88 (ASTM B88M), Type K (A), drawn; using one of the following joint types:
      a. Solder: ASTM B32 lead-free solder, HB alloy (95-5 tin-antimony) or tin and silver.
   2. Grooved Joints: AWWA C606 grooved tube, fittings of same material, and copper-tube-dimension mechanical couplings.
   3. Tee Connections: Mechanically extracted collars with notched and dimpled branch tube.

D. PVC Pipe: ASTM D1785, Schedule 40, or ASTM D2241, SDR 21 or 26.
   1. Fittings: ASTM D2466 or ASTM D2467, PVC.
   2. Joints: Solvent welded in accordance with ASTM D2855.

E. PVC Pipe Sizes 8 Inch (200 mm) and Greater: ASTM D1785, Schedule 80, or ASTM D2241, SDR 21 or 26.
   1. Fittings: ASTM D2466 or ASTM D2467, PVC.
   2. Joints: Solvent welded in accordance with ASTM D2855.
2.08 RADIANT HEATING PIPING
   A. Copper Tube: ASTM B88 (ASTM B88M), Type K (A) annealed.
      2. Joints: Braze, AWS A5.8M/A5.8 BCuP copper/silver alloy.

2.09 PIPE HANGERS AND SUPPORTS
   A. Provide hangers and supports that comply with MSS SP-58.
      1. If type of hanger or support for a particular situation is not indicated, select
         appropriate type using MSS SP-58 recommendations.
   B. In grooved installations, use rigid couplings with offsetting angle-pattern bolt pads
      or with wedge shaped grooves in header piping to permit support and hanging in
      accordance with ASME B31.9.

2.10 UNIONS, FLANGES, MECHANICAL COUPLINGS, AND DIELECTRIC CONNECTIONS
   A. Unions for Pipe 2 Inches (50 mm) and Less:
   B. Flanges for Pipe 2 Inches (50 mm) and Greater:
   C. Mechanical Couplings for Grooved and Shouldered Joints: Two or more curved
      housing segments with continuous key to engage pipe groove, circular C-profile
      gasket, and bolts to secure and compress gasket.
      1. Dimensions and Testing: In accordance with AWWA C606.
      2. Mechanical Couplings: Comply with ASTM F1476.
      4. When pipe is field grooved, provide coupling manufacturer’s grooving tools.

PART 3 EXECUTION

3.01 INSTALLATION
   A. Install in accordance with manufacturer’s instructions.
   B. PVC Pipe: Make solvent-welded joints in accordance with ASTM D2855.
   C. Route piping in orderly manner, parallel to building structure, and maintain
      gradient.
   D. Install piping to conserve building space and to avoid interfere with use of space.
   E. Group piping whenever practical at common elevations.
   F. Slope piping and arrange to drain at low points.

END OF SECTION 23 21 13