

SECTION 15181

CHILLED WATER PIPING, FITTINGS, INSULATION, AND INSTALLATION

PART 1 – GENERAL

1.01 SUMMARY

- A. This Section includes pipe, fittings, insulation material, joining methods, joint restraint, valves, and certain specialties for the following:
 - 1. Underground chilled water restrained joint pipe and fittings
 - 2. Gate valves
 - 3. Pipe and fitting insulation
 - 4. Protective pipe and fitting jacketing
 - 5. Tracer wire
 - 6. Locator tape
- B. All chilled water piping shall be insulated and installed as specified herein.
- C. All chilled water pipe, fittings and valves shall have restrained joints.

1.02 PERFORMANCE REQUIREMENTS

- A. Chilled water piping and all components and installation shall be capable of withstanding the following minimum operating conditions:
 - 1. Operating Pressure: 80-85 PSI
 - 2. Specified Acceptance Test Pressure: 150 PSI
 - 3. Supply Temperature: 39-400 °F
 - 4. Return Temperature: 48-550 °F
 - 5. Backfilled and compacted soil loads
 - 6. Groundwater and groundwater pressure
 - 7. Superimposed roadway pavement and vehicle loads

1.03 SUBMITTALS

- A. Provide product data for each type of the following:
 - 1. Pipe and pipe fittings
 - 2. Joint Restraints
 - 3. Insulation
 - 4. Insulation jacketing
 - 5. Field Insulation, Jacketing and Sealing
 - 6. Valves
 - 7. Tracer wire
 - 8. Locator tape
- B. Shop Drawings: As specified or detailed on the contract documents, provide details of the piping, fitting, and valve layout, fabrications, expansion joints and loops, and attachments. Detail locations of valves, bends, fittings, and expansion joints and loops.
- C. Field quality-control test reports.
- D. Operation and maintenance data.

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- E. JEA Pressure and Leakage Testing Documentation (JEA Standards Section 350)
- F. JEA Record/As-Built Drawing documentation (JEA Standards Section 501)

1.04 QUALITY ASSURANCE and STANDARDS

- A. ASME B31.3: "Process Piping," latest edition
- B. ASME B31.9: "Building Services Piping," latest edition
- C. ASHRAE: "Handbook," latest edition
- D. ASHRAE: "District Cooling Guide," latest edition
- E. JEA: "Water & Wastewater Standards Manual," 2020 Edition (JEA Standards)

PART 2 - PRODUCTS

2.01 CHILLED WATER PIPE AND FITTINGS

- A. Chilled water pipe and fittings shall comply with JEA Standards Sections 350 I.-III. and applicable details. Pipe and fitting joint restraints shall comply with JEA Standards Section 350 II.3.6. All chilled water pipe, fittings and valves shall have restrained joints.
- B. Linear Expansion Joint: Expansion joints shall be installed at the locations indicated on the drawings and shall be manufactured of ductile iron conforming to the material properties of ANSI/AWWA C111/A21.11, or ANSI/AWWA C153/A21.53 (size dependent). All expansion joints shall be capable of expanding or contracting to the amounts shown on the drawings, or indicated in the specifications, but in no case shall there be more than 8-inches total axial movement. The expansion joint shall be shipped with its full, restrained expansion limit of its total axial movement. Expansion seals shall comply with ANSI/AWWA C111/A21.11. Separation beyond the maximum extension of the expansion joint shall be prevented without the use of external tie rods. The expansion joint shall be factory pressure tested against its own restraint to a minimum of 350 psi (250 psi 24-inch and greater). A specified mechanical restraint shall be provided on both mechanical joint connections. All pressure containing/wetted parts shall be lined with a minimum of 15 mils of fusion bonded epoxy, conforming to the applicable requirements of ANSI/AWWA C213 and NSF 61, and shall be factory tested with a 1500-volt spark test conforming to the AWWA specification. All expansion joints shall be EX-TEND Series 200-M1, as manufactured by EBAA Iron, Inc., or ENGINEER approved equivalent.

2.02 CHILLED WATER GATE VALVES

- A. Chilled water gate valves shall comply with JEA Standards Sections 351 VI. and applicable details. Valve boxes shall comply with JEA Standards Sections 351 X. and applicable details.

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2.03 TAPPING SLEEVES AND VALVES

- A. Tapping sleeves and valves shall comply with JEA Standards Sections 351 VIII. and applicable details. Valve boxes shall comply with JEA Standards Sections 351 X. and applicable details.
- B. When tapping high density polyethylene pipe (HDPEP), the Contractor shall use a tapping saddle specifically designed for HDPEP pressurized, watertight connections. The Contractor shall install the tapping saddle, tighten all installation hardware, and allow at least 24-hours for temperature expansion/contraction equalization between the chilled water HDPEP and the tapping saddle before final hardware tightening prior to the tapping saddle and tapping valve pressure test in accordance with JEA Standards 351.VI.8. The Contractor shall provide temporary insulating material(s) as required for the expansion/contraction equalization period.

2.04 PIPE AND FITTING INSULATION

- A. Waterproof Insulation: Injected 2-pound (minimum) density polyurethane foam, 90% to 95% closed cell, with a minimum K factor of 0.15 Btuh/sq. ft./deg. F/inch. The insulation shall be 1-1/2-inch minimum thickness. The insulation shall be factory installed on the chilled water pipe under dry conditions in accordance with the manufacturer's submitted written requirements.
- B. Insulation End Seal: The ends of all factory installed insulation shall be completely sealed with a high temperature rated black mastic end seal. Additional end seal material shall be included with the delivery of the pre-insulated chilled water pipe for field connections and seal repair.
- C. Pipe and Fitting Casing: All pre-insulated chilled water pipe shall have a high-density polyethylene (HDPE) seamless, watertight, casing factory installed. The HDPE casing shall be Type III, Category 5, Class C, conforming to ASTM Standard D-1248, latest edition. The casing shall have a minimum thickness as follows:
 - 0.175-inch thick – 6-inch to 10-inch dia. pipe
 - 0.200-inch thick – 12-inch to 16-inch dia. pipe
 - 0.225-inch thick – 18-inch to 20-inch + dia. pipe
- D. Field Fitting Casing Kit: All chilled water pipe, joints, fittings, and valves that were not pre-insulated at the factory, shall be field insulated by a factory trained manufacturer's field technician. A size and fitting specific field kit with mitered HDPE casing segments, dense foam spacers for the casing installation, pourable polyethylene foam, and adhesive, watertight, heat shrink tape (Polyken, Covalence, or ENGINEER approved equivalent) shall be used.
- E. Pre-insulated chilled water pipe systems (or ENGINEER approved equivalent)
 - 1. Energy Task Force: ETF-MT
 - 2. Tricon Piping System, Inc.
 - 3. Thermacor Process, Inc.

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2.05 TRACER WIRE

- A. Tracer wire shall comply with JEA Standards Sections 350.II.6 and applicable details.

2.06 LOCATOR TAPE

- A. Locator tape shall be placed in the chilled water pipe trench as shown on the contract drawings. The tape shall be 6-inches wide polyethylene film, APWA blue in color with continuous black, block lettering "CAUTION CHILLED WATER LINE BURIED BELOW."

PART 3 - EXECUTION

3.01 CHILLED WATER PIPING

- A. Chilled water piping, fittings and valves shall be installed in accordance with JEA Standards Sections 350 and 351 and the project specific geotechnical engineering report recommendations. The CONTRACTOR shall be responsible for the use of suitable native and imported soils to be used for bedding, backfilling and compaction of the chilled water pipe to protect the protective insulation jacketing from any damage, including indentation, cuts, gouges, scrapes and waterproof sealants and tapes adhesion.
- B. Unless otherwise noted in the contract documents, all chilled water pipe, fittings and valves shall have restrained joints.
- C. The CONTRACTOR shall be responsible for the furnishing, installing and testing of the complete pre-insulated piping, including waterproof thermal insulation, protective HDPE jacket casing, field casing sealing, field insulation and casing installation, fittings, valves, joint restraint and expansion loops, elbows, or pipe joints, if required, and all other labor, materials and equipment to provide a fully functional chilled water piping system as specified in this document and shown on the contract drawings.
- D. The CONTRACTOR shall install the chilled water piping system in accordance with the pipe insulation manufacturer's instructions, including, but not limited to the unloading and storing of all chilled water system components, field application of factory provided end seal material for all field cut pipe, trenching with proper attention to required minimum cove height, bedding and backfill soils, laying, trench dewatering, pipe joining, and field joint, fitting and valve insulation procedures.
- E. The CONTRACTOR shall provide a qualified manufacturer's technician who will be present during critical period of the factory and field installation and testing of the pipe insulation system. The technician must be in the direct employ of the insulation system manufacturer. The technician shall provide written field service reports to JEA for all chilled water pipe insulation installation and testing in the factory and field. The certified technician's services shall be included in the unit price of all work required and shall not be an extra cost to JEA.

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- F. After the chilled water piping system installation and prior to backfilling, the technician shall field inspect the piping insulation and casing system and certify in writing to JEA that the piping insulation system has been assembled and installed within the guidelines of the manufacturer's writing installation instructions.
- G. The trench shall remain dry with no running or standing water until all field installed insulation and HDPE casing have been installed and sealed watertight.
- H. The linear expansion joint shall be installed, and its body, joints and adjoining pipe encased in a securely waterproof taped polyethylene sleeve in accordance with ANSI/AWWA C105/ A21.50 (Method A) and ASTM A674, in accordance with JEA Standard 350.II.3.10.
- I. The CONTRACTOR shall perform chilled water system pre-test swabbing in accordance with JEA Standard 350.III.6.1 and pressure and leakage testing in accordance with JEA Standard 350.III.6.3.

PART 4 – MEASUREMENT AND PAYMENT

- A. Measurement and payment for the chilled water system shall be in accordance with JEA Standards Section 801.

END OF SECTION 15181