ADDENDUM NO. 1

ISSUE DATE: April 15, 2016

CRC Science and Business Hydronic Replacement

LRCCD BID NO. 16018

Issued By:

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This addendum forms a part to the Contract Documents. The addendum items supersede and supplement all portions of the bidding documents with which it conflicts. All workmanship, materials, appliances and equipment which may be included in the following addendum items shall be of the same relative quality as described for similar work set forth in the general or main specifications of which these addendum items shall be considered a part.

This Addendum has been acknowledged in the space provided on the Bid Form and is considered part of the bid documents.

This Addendum consists of 39 pages.

1) Revised Sections replace original Project Manual Sections:
   a) 23 05 23 VALVES AND PIPING SPECIALTIES
   b) 23 05 93 TESTING ADJUSTING AND BALANCING
   c) 23 07 00 MECHANICAL INSULATION
   d) 23 21 00 HYDRONIC SYSTEMS AND EQUIPMENT
2) Drawings are added information:
   a) AD-1 SCIENCE BUILDING 400 MECHANICAL DEMOLITION PLAN
   b) AD-2 BUSINESS WEST BUILDING MECHANICAL HYDRONIC DEMOLITION FLOOR PLAN
   c) AD-3 BUSINESS EAST BUILDING MECHANICAL HYDRONIC DEMOLITION FLOOR PLAN
   d) AD-4 SCIENCE BUILDING 400 MECHANICAL FLOOR PLAN
   e) AD-5 BUSINESS WEST BUILDING MECHANICAL HYDRONIC FLOOR PLAN
   f) AD-6 BUSINESS EAST BUILDING MECHANICAL HYDRONIC FLOOR PLAN
   g) AD-7 ENLARGED MECHANICAL NEW ROOMS AND DIAGRAMS
   h) AD-8 ENLARGED MECHANICAL NEW ROOMS AND DIAGRAMS
   i) AD-9 SCIENCE BUILDING MECHANICAL DEMOLITION ROOF PLAN
   j) AD-10 SCIENCE BUILDING MECHANICAL NEW ROOF PLAN
   k) AD-11 SCIENCE BUILDING MECHANICAL NEW ROOF PLAN
   l) AD-12 SCIENCE BUILDING 400 MECHANICAL FLOOR PLAN
   m) AD-13 SCIENCE BUILDING 400 MECHANICAL FLOOR PLAN
   n) AD-14 SCIENCE BUILDING 400 MECHANICAL FLOOR PLAN
   o) AD-15 BUSINESS EAST BUILDING MECHANICAL HYDRONIC ROOF PLAN

END OF SECTION.
PART 1 GENERAL

1.1 WORK INCLUDED:

A. Types of piping specialties specified in this section include the following:

- Fully ported Flange bodies.
- Pipe Escutcheons
- Pipeline Strainers
- Sleeves
- Sleeve Seals
- Unions and Flanges

B. Types of valves specified in this section include the following:

- Ball Valves
- Globe Valves
- Balance Valves
- Drain Valves
- Butterfly Valves
- Check Valves
- Gate Valves (Steam Only)
- Automatic Air Vents

1.2 QUALITY ASSURANCE:

A. Manufacturers Qualifications: Firms regularly engaged in manufacturing of plumbing piping (including medical gas) systems products, of types, materials and sizes required. Whose products have been in satisfactory use in similar service for not less than five (5) years. On changes, submittals, etc., Contractor shall supply needed documents to support the manufactures’ qualifications.

B. Valve Types: Provide valves of same type by same manufacturer.

C. Identification: Provide piping specialties and valves with manufacturer's name (or trademark) and pressure rating clearly marked on valve body.

D. Requirements of Regulatory Agencies:

1. UL and FM Compliance: Provide valves used in fire protection piping which are UL listed and FM approved.

1.3 SUBMITTALS:

A. Product Data: Submit manufacturer's technical product data and installation instructions for each type of manufactured piping specialty and valve.

1. Include pressure drop curve or chart for each type and size of valve, control valve and balancing valve.
B. Maintenance Data: Submit maintenance data and spare parts lists for each type of manufactured piping specialty and valve. Include this data and product data in maintenance manual in accordance with requirements of Division 1.

PART 2 PRODUCTS

2.1 MATERIALS:

A. Provide factory-fabricated piping specialties and valves recommended by manufacturer for use in service indicated. Provide piping specialties of types and pressure ratings indicated for each service, or if not indicated, provide proper selection as determined by Contractor to comply with installation requirements. Provide sizes and connections which properly mate with pipe, tube, and equipment connections. Where more than one type is indicated, selection is Contractor's option.

B. Unless otherwise indicated, provide valves of same size as upstream pipe size.

2.2 PIPE ESCUTCHEONS:

A. Provide chrome plated brass pipe escutcheons with inside diameter closely fitting pipe outside diameter or outside of pipe insulation where pipe is insulated. Select outside diameter of escutcheon to completely cover pipe penetration hole in floors, walls, ceilings, or pipe sleeve extension, if any. Furnish pipe escutcheons with nickel or chrome finish and screw or spring clamping device with concealed hinge.


2.3 PIPE SLEEVES:

A. Where pipes pass through concrete floors or walls, install 24 ga. galvanized metal having not less than 1/2-inch or more than 1-inch clearance around sides of the pipe or pipe covering for the full thickness of the concrete.

1. After piping has been installed, fill annular space with fireproof safing.

B. Manufacturers: Adjustocrete, Sperzel "Crete-Sleeve", or equal.

2.4 SLEEVE SEALS:

A. Provide sleeve seals for sleeves located in foundation walls below grade or in exterior walls as follows:

1. Foundations: Lead and oakum, caulked between sleeve opening and pipe, link seal.

2. Walls and Floors: Modular-mechanical type, consisting of interlocking synthetic rubber links shaped to continuously fill annular space between pipe and sleeve, connected with bolts and pressure plates which cause rubber sealing elements to expand when tightened, providing watertight seal and electrical insulation.

2.5 UNIONS AND FLANGES:

A. Furnish and install unions at each threaded or soldered connection to all existing equipment, existing tanks and existing valves, of type specified in following schedule:

<table>
<thead>
<tr>
<th>Type of Pipe</th>
<th>Union</th>
</tr>
</thead>
<tbody>
<tr>
<td>Steel pipelines, 2&quot; and smaller</td>
<td>250 lb. screwed malleable ground joint, brass to iron seat, black for black pipelines, galvanized for galvanized lines.</td>
</tr>
<tr>
<td>Copper tubing, 2&quot; and smaller</td>
<td>250 lb. bronze ground joint, bronze to bronze sweat connection.</td>
</tr>
<tr>
<td>Copper tubing, 2-1/2&quot; and larger</td>
<td>250 lb. cast bronze, flat faced flange with silver brazing threadless ends.</td>
</tr>
</tbody>
</table>

B. Insulating couplings or flanges shall be furnished and installed at all connections of piping with dissimilar materials. Construct couplings so that the two pipes being connected are completely insulated from each other with no metal-to-metal contact. Heavily line the couplings with a hard, insulating, phenolic threaded coupling in standard pipe sizes.

Use dielectric flange kit.

C. Dielectric nipples may be used on piping 2" and smaller.

D. Furnish and install flanges at each flanged connection to existing equipment, existing tanks, and existing valves per following schedule:

<table>
<thead>
<tr>
<th>Type of Pipe</th>
<th>Flanges</th>
</tr>
</thead>
<tbody>
<tr>
<td>Screwed black or galvanized steel pipelines, 2-1/2&quot; and larger</td>
<td>125 lb. cast-iron screwed flange flat faced, black or galvanized as required, unless noted otherwise.</td>
</tr>
<tr>
<td>Welded steel pipe, 2-1/2&quot; and larger</td>
<td>150 lb. forged steel welding flanges, 1/16&quot; raised faced, unless noted otherwise.</td>
</tr>
</tbody>
</table>
E. Provide full faced or ring type gasket material to suit facing on flanges per following schedule:

<table>
<thead>
<tr>
<th>Service</th>
<th>Type</th>
</tr>
</thead>
<tbody>
<tr>
<td>Hot Water</td>
<td>1/16” thick Garlock Blue Guard, or equal, no known equal.</td>
</tr>
</tbody>
</table>

2.6 EXPANSION JOINTS:

A. Combination Couplings and Nipples: Provide expansion joints constructed of cut, grooved, short pipe nipples and couplings, designed by manufacturer to suit intended service. Provide removable ties to hold joint compressed or expanded during piping fabrication, depending on application. Select standard weight couplings and gasket materials to match balance of piping system. Provide at least three couplings at each expansion joint indicated on Drawings as recommended by manufacturer.

B. Manufacturers: ITT Grinnell, Stockham Valves and Fittings, Inc., Vitaulic Company of America, or equal.

2.7 FLEXIBLE CONNECTIONS:

A. Combination Couplings and Nipples: Provide flexible connections constructed of cut grooved short pipe nipples and couplings, designed by manufacturer to suit intended service. Select standard weight couplings and gasket materials to match balance of piping system.

B. Provide flexible connections at inlets and outlets of pumps, constant volume boxes, and where shown on drawings.

C. Flexible connections shall be:

1. For pipe size above 1”: Thermotech or Flextronic model SST braided stainless steel. Flexible hose section shall be 321 stainless steel, close pitch, annular corrugated hose with a braided outer covering of 304 stainless steel. End connections to be carbon steel, male pipe thread or flanged connections for piping 3” and larger. Overall length to allow for ¼” flexing or per manufacturers recommendations. Working pressure shall be minimum 200 psi.

2. Flexible connections for piping 1” and smaller shall be Thermotech or Flextronic Model BBS, bronze hose and braid flexible connector with sweat ends. Allow for 3/8” intermittent flexing. Working pressure shall be minimum of 250 psi.

D. Expansion Loop:

1. Flexible loops shall consist of two flexible sections of hose and braid, two 90° elbows, and 180° return. Loops shall include a factory supplied, center support nut located at the bottom of the 180° return, and a drain/air release plug. Materials of construction and end fitting type shall be consistent with pipe material and equipment/pipe connection fittings. Flexible expansion/seismic loops to be Metraflex or equal.

E. Manufacturers: ITT Grinnell, Metraflex, Stockham Valves and Fittings, Inc., Vitaulic Company of America, or equal
2.8 HIGH AND LOW-PRESSURE, Y-TYPE PIPELINE STRAINERS:

A. Provide strainers full-line size of connecting piping, with ends matching piping system materials and cast-iron body. Select strainers for 250 psi (high pressure) and 125 psi (low pressure) working pressure, with monel screens and gasket seal on plug. Provide ball valve - no globe or needle valves. Smallest valve to be 1/2" IPS. All with 3/4" hose connector.

B. Strainer screens shall have an open area equal to at least twice the cross-sectional area of the pipe in which they are installed (based on IPS) and may be either woven wire or perforated type in accordance with the following:

1. All Services: .045-inch diameter perf. or 16 square mesh.


2.9 VALVES:

A. Provide valves as shown and other valves necessary to segregate branches or units. Furnish discs suitable for service intended. Furnish a brass tag with unique identification of service controlled for each valve. Properly pack and lubricate valves. Provide flanged valves in welded pipe. All globe valves shall be union body style.

1. All fixtures and equipment branch lines to have shut off valves at branch connection.

2. All Shut Off Valves 2” and larger will be IPS w/threaded union (both ends). Solder joint valves may be used on piping 1-1/2” and smaller. All angle stops will be IPS at wall, loose key.

3. Shut off valves on heating and chilled water to be ball valves thru 2” and butterfly 2-1/2" and up.

4. Valves installed in insulated piping lines shall have valve handle extensions to clear the insulation. On insulation, affix label for valve location with directional arrow.

5. Shut off valves shall be provided locally, upstream and downstream of all dielectric insulating fittings (unions, nipples, flanges, etc.) so that repairs can be made easily on these fittings.

B. Basic Valves:

1. Provide valves complying with 23 05 01 Basic Mechanical Materials and Methods sections, in accordance with the following listing:

a. Valves:

1) 2 inches and Smaller: Ball valves: Nibco Full Port 150 SS WP, 600 WOG WP, MSS SP-110. T-595 (threaded) or S-585-70 (solder) is allowed to 1-1/2” pipe size.
2) 2-1/2 inches and Larger: Butterfly valves: Nibco LD 2000, 200 psi WP, MSS-SP67, MSS-SP25, API-609, stainless steel stem, ASTM A-582 type 416. Ductile iron body, extended neck, lug style with EPDM liner, aluminum bronze disk. Butterfly valves 8” and larger shall be equipped with gear operator, worm gear type. Provide with memory stop and hand wheel. Provide stem extensions where necessary. Butterfly valves located above 10'-0” above floor shall have adjustable sprocket rim with chain. Chain height shall be 6'-6” above finished floor.

b. Drain Valves:

1) 2 inches and Smaller: Ball valves: Nibco Full Port 150 SS WP, 600 WOG WP, MSS SP-110. T-585-70 (threaded) or S-585-70 (solder) is allowed to 1-1/2” pipe size.

2) 2-1/2 inches and Larger: gate valves: Nibco F19N, Class 125, iron body, MSS SP-70.

3) Hose bibbs are not to be used as drain valves on low point drains, equipment, etc.

c. Check Valves:

1) All: Swing check valves or in-line spring loaded check valves.

2) Check valve to 1-1/2”: Nibco T 413, S-433 swing check, Class 150, MSS SP-80 or T 480, S480 spring actuated resilient disk MSS-SP-80. Nibco 2” and larger: F-918, MSS SP-71, Class 125. Nibco 2-1/2” and larger: F910, MIL-V-18436F.

d. Balance Valves:

1) Balancing valves to be Armstrong, Victaulic, ITT Circuit Setters, or equal. Valve shall provide multi-turn, 360 degree adjustment with a micrometer type indicator located on valve hand wheel. Valve handwheel shall have hidden memory feature which will provide a means for locking the valve in position after the system has been balanced.

C. Four-inch and larger gate, Globe or O S & Y valves located 10 feet or higher above floor shall be provided with chain operators.

D. Air Vent Valves: Manual air vents and automatic air vents shall be furnished as detailed on Drawings complete with globe valve. Globe valve pressure ratings shall be as required for system on which installed. At all high points, reheat coils, the air vent assemblies shall consist of a 1/4" sov and a 2" x 12" nipple air chamber with 1/4" tubing connected to the top. Attach a 1/4" globe valve with 3/4" hose connection at end of tubing, termination point to be within 6" of ceiling or access door or to nearest floor drain or as shown.

1. Manufacturers: Hoffman No. 79 Water Main Vent Valve (Manual Vent), Armstrong No. 75 (Automatic Air Vent), or Equal.
E. Shut off valves located in ceilings, walls, and floors shall be accessible through access doors or ceiling lift out tiles (finished ceiling). Valve handles shall be located within 24” of access door.

F. Automatic Air Vents: ITT Model 87. Use at expansion tank and where shown on drawings.

G. High Capacity Air Vent: ITT Model 107A. Use for each air separator and where shown on drawings.

PART 3 EXECUTION

3.1 INSTALLATION OF PIPING SPECIALTIES:

A. Pipe Escutcheons: Install pipe escutcheons on each pipe penetration through floors, walls, partitions, and ceilings where penetration is exposed to view and on exterior of building. Secure escutcheon to pipe or insulation so escutcheon covers penetration hole and is flush with adjoining surface.

B. Sleeves: Secure sleeves to metal or wood forms in such a manner that they will not become displaced during pouring of concrete. Fill sleeves on deck with sand. After forms have been removed from concrete, the sleeves shall be removed from the openings.

C. Core drill properly sized holes in the concrete to replace metal sleeves that are crushed or knocked out of position during pouring of concrete.

D. Sleeve Seals: Install in accordance with the following:
   1. Lead and Oakum: Fill and pack annular space between sleeve opening and pipe with oakum; caulk with lead on both sides.
   2. Mechanical Sleeve Seals: Loosely assemble rubber links around pipe with bolts and pressure plates located under each bolt head and nut. Push into sleeve opening and center. Tighten bolts until links have expanded to form watertight seal.

E. At completion of project, Contractor shall submit a valve listing for all valves installed on the project. All valves shall be tagged with 2" diameter brass tags noting valve number and contents in the pipe. Valve listing shall note valve tab number, contents in the pipe and the areas (room numbers, etc.) that are impacted when valve is in the closed position. Separate lists shall be made for the plumbing and mechanical systems. Valve listing sheets shall be 8-1/2" x 11" installed in a frame with glass cover and suitable for hanging in an area selected by Owner. Charts shall be colored to indicate different piping systems, i.e. blue cold water, gray gas, red fire, etc. Submit CD disk of an electronic copy of valve list.

3.2 INSTALLATION OF Y-TYPE STRainers:

A. Install Y-type strainers full size of pipeline in accordance with manufacturer's installation instructions. Install pipe nipple and shutoff valve in strainer blow down connection, full size of connection, except for strainers 2 inches and smaller installed ahead of control valves feeding individual terminals. No smaller than 1/2" - use ball. Where indicated, provide drain line from shutoff valve to plumbing drain, full size of blow-down connection.
B. All strainers shall have ball valve blow down valves not less 1/2" in size with 3/4" hose connector and cap.

C. Locate Y-type strainers in supply line ahead of the following equipment and elsewhere as indicated if integral strainer is not included in equipment:

- Backflow Assemblies
- Pumps
- Temperature control valves
- Pressure-reducing valves
- Temperature- or pressure-regulating valves

D. Prior to equipment start up and after system flush, remove each strainer basket and clean basket.

3.3 INSTALLATION OF VALVES:

A. Install valves where required for proper operation of piping and equipment, including valves in branch lines where necessary to isolate sections of piping. Locate valves so as to be accessible and so that separate support can be provided when necessary. All branches from vertical risers to have S.O.V.’s (shut off valves).

B. Install valves with stems pointed up, in vertical position where possible, but in no case with stems pointed downward from horizontal plane. Do not install check valves designed for horizontal use in the vertical position.

C. Provide union at each connection to equipment and downstream of each valve. Provide unions at both ends of valves when valves cannot be turned due to an obstruction. Contractor shall furnish to Owner extended tee style valve handles for in-ground valves and special application valves with removable handles.

D. After piping systems have been tested and put into service, but before final testing, adjusting, and balancing, inspect each valve for possible leaks. Adjust or replace packing to stop leaks; replace valve if leak persists.

E. Tag each valve and provide a complete listing of valve locations and functions.

3.4 INSTALLATION OF UNIONS AND FLANGES:

A. Install unions and flanges so that piping can be easily disconnected for removal of tanks, equipment, and valves. Provide a minimum of three unions at each three-way valve.

END OF SECTION
PART 1

1. WORK INCLUDED:

A. Test and balance of hydronic distribution systems and associated equipment and apparatus of mechanical work.

B. Setting and adjusting speed and volume of systems, recording data, conducting tests, preparing and submitting reports, and recommending modifications to work as required by contract documents.

C. Component types of testing, adjusting, and balancing specified in this section includes the following as applied to mechanical equipment:

   - Air handling units
   - Pumps
   - Coils and heat exchangers
   - Piping systems
   - Terminal units

1. QUALITY ASSURANCE:

A. Independent testing agency that specializes in testing, analysis, and balancing of hydronic systems and air distribution for heating-cooling systems. Work shall be done by qualified engineering technicians and trained personnel, using instruments certified accurate to limits used in standard practice for testing and balancing of hydronic and air distribution for heating-cooling systems. Agency shall field test air and hydronic flows in accordance with methods set up by Associated Air Balance Council, National Standard Volume 1, latest edition.

B. Balance agency shall be a member of Associated Air Balance Council. Subject to compliance with requirements, balance agency may be one of the following:

   - Carter Air Balance
   - RSA or equal

C. Contractor shall submit the Balance Agency results of tests in this SECTION for review by the Owner's Representative.

D. AABC Compliance: Comply with AABC's "National Standards," Volume 1, as applicable to mechanical air and hydronic distribution systems and associated equipment and apparatus.

E. Industry Standards: Comply with ASHRAE recommendations pertaining to measurements, instruments and testing, adjusting and balancing, except as otherwise indicated.
F. Reference Standards:

1. AABC - Associated Air Balance Council - A National Standard Volume 1
2. ASHRAE - American Society of Heating, Refrigerating, and Air Conditioning Engineers, Inc.
3. NEBB - National Environmental Balance Bureau

1.3 SUBMITTALS:

A. Provide submittals to indicate the extent of work proposed. Submit certified test reports as hereinafter specified signed by Test and Balance Supervisor who performed test and balance work.

B. Include identification and types of instruments used and their most recent calibration date with submission of final test report.

C. Provide submittal of completed balance report prior to request for final mechanical observation of the project.

1.4 JOB CONDITIONS:

A. Balance agency shall perform the following during installation phase of systems:

1. Study design specifications and engineering Drawings and prepare schedule to physically inspect mechanical equipment for hydronic and air distribution systems to be tested and balanced. Contractor shall provide balance agency with one copy of Contract Drawings and specifications, mechanical equipment submittals, and change orders necessary for proper balancing of air distribution systems.

2. Balance agency shall make field inspections prior to closing in portions of systems to be balanced. Agency shall verify to its satisfaction that all work, fittings, dampers, balancing devices, etc. are properly fabricated and installed as shown or specified and that Agency will be able to properly balance system.

3. Prepare test and balancing schedule, test record forms, and necessary technical information about hydronic and air distribution systems for installed heating-cooling equipment.

4. Recommend adjustments and/or corrections to mechanical equipment and hydronic and air distribution systems that are necessary for proper balancing of systems.

PART 2 PRODUCTS

2.1 TEST INSTRUMENTS:

A. Utilize test instruments and equipment for test and balance work required, of type, precision, and capacity as recommended in the following test and balance standards:

3.1 BALANCING:

A. Upon completion of hydronic and air handling systems, balance agency shall complete tests, analysis, and balance of hydronic and air handling systems for heating-cooling equipment.

B. This report shall include as minimum, but not be limited to, following design and actual information:

1. Motors and Pumps: Horsepower, brake horsepower, revolutions per minute, actual amperage, and full-load rated current.

2. Pumps: Suction and discharge pressure.

3. Coils: Gallons per minute, fluid temperature, and air temperature at outlet and inlet.

3.2 BALANCE REQUIREMENTS:

A. After final hydronic balance of systems, make adjustments to obtain uniform temperatures as required by actual occupancy.

B. Work with temperature Control Subcontractor in adjustment of automatic, valves, thermostats, etc. required to maintain proper temperatures in all portions of building.

C. Contractor responsible for installing heating, cooling, and ventilating equipment shall make any changes, additions, or modifications, pump impellers, motors, and other equipment necessary for proper hydronic balance.

D. Balance of systems shall be reviewed by Owner's Representative and during this review Mechanical Contractor shall furnish men, materials, ladders, etc. to enable Owner's Representative to take all readings as he may direct. If errors are found, Balancing Agency shall readjust system to satisfaction of Owner's Representative.

E. Submit test equipment used to Owner's Representative for review before beginning work.

END OF SECTION
SECTION 230700 – MECHANICAL INSULATION

PART 1 GENERAL

1.1 WORK INCLUDED:

A. Types of mechanical insulation specified in this section include the following:

   1. Piping System Insulation:
      
      Chilled Water Supply and Return
      Heating Hot Water Supply and Return

   Valves installed in insulated piping lines shall have valve handle extensions to clear the insulation. On insulation affix label for valve location and directional flow.

   Insulation - 2” TIW fiberglass blanket
   Jacketing - Silicone glass cloth (15 oz minimum -both sides with silicone)
   Lacing Hooks - Stainless steel
   Lacing Wire - Stainless steel
   Pad seam attachment - Sewn with glass thread only, or equal, no known equal.

   Execution: Both the interior and exterior of the pad shall be silicon glass cloth. The pad is to be custom fit tight to the backflow preventor. Toaster cover design is not acceptable. Construct pad with seam at bottom to allow drainage.

1.2 QUALITY ASSURANCE:

A. Manufacturer's Qualifications: Firms regularly engaged in manufacture of mechanical insulation products, of types and sizes required, whose products have been in satisfactory use in similar service for not less than 3 years.

B. Installer's Qualifications: Firm with at least 5 years successful installation experience on projects with mechanical insulations similar to that required for this project.

C. Install thermal insulation products on equipment in accordance with manufacturer's written instructions and in accordance with recognized industry practices to ensure that insulation serves its intended purpose.

D. Flame/Smoke Ratings: Provide composite mechanical insulation (insulation, jackets, coverings, sealers, mastics, and adhesives) with flame-spread rating of 25 or less and smoke-developed index of 50 or less, as tested by ASTM E 84 (NFPA 255) method.

E. Building insulation shall comply with California Quality Standards for insulating material.

F. Insulation material shall be certified by the California Energy Commission.

1.3 SUBMITTALS:

A. Product Data: Submit manufacturer's technical product data and installation instructions for each type of mechanical insulation. Submit schedule showing manufacturer's product number, K-value,
PART 2 PRODUCTS

2.1 PIPE INSULATION MATERIALS:

A. Fiberglass Insulation:

1. Fiberglass Pipe Insulation, with ASJ-SSL II jacket, or equal, with factory-applied, fire-retardant jacket and self-sealing laps, applied per manufacturer's recommendations. Pipe insulation shall comply with ASTM C-547 Type I (Grade A).

2. Vaporwick Pipe Insulation, with factory-applied polymer facing, applied per manufacturer’s recommendations.

3. Insulate fittings with Hamfab fittings, or equal, premolded insulated covering secured with Standard fasteners.

4. Install a segment of rigid insulation at each pipe hanger for pipe sizes 2-1/2 inches and larger.

5. Finish all cold fittings with mastic and Z-tape to provide a vapor seal.

6. Insulate Victaulic couplings with a 12-inch long segment of Fiberglass as specified for concealed piping.

7. Manufacturers: Owens-Corning, or equal.

2.2 HEATING HOT WATER:

A. Insulate concealed heating hot water supply and return piping with fiberglass insulation. Minimum Insulation Thickness:

1. Piping 1 inch and smaller: 1-1/2 inch.


3. Piping 2-1/2 to 6 inches: 2 inches.

Piping 8 inches and larger: 3.5 inches.

2.3 CHILLED WATER PIPES

A. Insulate concealed chilled water supply and return piping with fiberglass insulation.
1. Piping 1 inch and smaller: 1.0 inch.

2. Piping 1.25 inches to 2 inches: 1.0 inch.

3. Piping 2.5 inches to 4.0 inches: 1 inch.

2.4 EXPOSED INSULATED PIPING:

A. On all insulated piping exposed to the weather apply .016 aluminum jacket (stucco embossed) secured with 1/2" aluminum bands on 12" centers. Cover fittings with six ounce canvas and two coats of Foster’s 30-36 fitting covers. Insulation shall be vaportight before applying metal jackets.

B. All insulated piping exposed in occupied spaces or mechanical rooms shall have a Proto or equal, 25/50 rated PVC jacket. Color as selected, installed and sealed per manufacturer’s recommendations.

2.5 HEATING EQUIPMENT:

A. Insulation material shall be flexible, closed-cell elastomeric insulation in tubular or sheet form, Armstrong AP Armaflex AP Armaflex SS or AP Armaflex SA.

B. Materials shall have a flame spread rating of 25 or less and a smoke developed rating of 50 or less when tested in accordance with ASTM E84, latest revision. Sheet material with a thickness greater than ¼” shall have a flame spread rating of 25 or less and a smoke developed rating of 100 or less when tested in accordance with ASTM E84, latest revision. In addition, the product when tested shall not melt or drip flaming particles, and the flame shall not be progressive. In addition, all materials shall pass simulated end-use fire tests.

C. Materials shall have a maximum thermal conductivity of 0.27 Btu-in/h-ft²-°F at a 75°F mean temperature when tested in accordance with ASTM C177 or ASTM C518, latest revisions.

D. Materials shall have a maximum water vapor transmission of 0.10 perm-inches when tested in accordance with ASTM E96 (Procedure A), latest revision.

E. The material shall be manufactured under an independent third party supervision testing program covering the properties of fire performance, thermal conductivity and WVT.

F. Adhesives and Finishes:

1. Adhesive shall be the insulation manufacturer’s recommended contact adhesive, Armstrong 520 Adhesive.

2. Insulation finish shall be the insulation manufacturer’s recommended finish, Armstrong WB Armaflex Finish or Armstrong SB Armaflex Finish.

3. Accessories such as adhesives, mastics and cements shall have the same properties as listed above and shall not detract from any of the system ratings as specified above.

G. Valves, Flanges and Equipment:
1. All fittings shall be insulated with the same insulation thickness as the adjacent piping. All seams and mitered joints shall be adhered with 520 Adhesive. Screwed fittings shall be sleeved and adhered with a minimum one-inch overlap onto the adjacent insulation.

2. Valves, flanges, strainers and Victaulic couplings shall be insulated using Armaflex donuts that shall then be covered with sheet or oversized tubular insulation.

H. The entire surface of the canvas jacket shall have a finish sizing consisting of one brush coat of dilute adhesive.

I. Do not insulate expansion tanks and hot water pump casings.

J. Provide removable Armaflex closed cell plugs for access to ports, strainers, Pete’s plugs, balancing valves and other devices which require access.

K. Manufacturers: Armaflex.

PART 3 EXECUTION

3.1 INSTALLATION OF PIPING INSULATION:

A. Install insulation products in accordance with manufacturer's written instructions and in accordance with recognized industry practices to ensure that insulation serves its intended purpose.

B. Install insulation on pipe systems subsequent to testing and acceptance of tests.

C. Install insulation materials with smooth and even surfaces. Insulate each continuous run of piping with full-length units of insulation, with single-cut piece to complete run. Do not use cut pieces or scraps abutting each other.

D. Clean and dry pipe surfaces prior to insulating. Butt insulation joints firmly together to ensure complete and tight fit over surfaces to be covered.

E. The term "piping" used herein shall include pipe, valves, strainers, and fittings. Apply insulating cements to fittings, valves, and strainers, and trowel smooth to the thickness of adjacent covering. Covering on valves shall extend up to the bonnet. Leave strainer cleanout plugs accessible. Valve and fitting covers may be preformed PVC. Provide rigid insulation, 18” minimum length at each pipe hanger. Seal ends of insulation with jacket.

F. Extend piping insulation without interruption through walls, floors, and similar piping penetrations, except where otherwise indicated.

G. Install pipe hangers on the outside of the insulation and not in contact with the pipe. Protect insulation as hereinbefore specified under Hangers and Supports.

H. Neatly taper raw ends of insulation and seal with canvas and sealant as noted for fittings.
3.2 INSTALLATION OF EQUIPMENT INSULATION:

A. Install insulation materials with smooth and even surfaces and on clean and dry surfaces. Redo poorly fitted joints. Do not use mastic or joint sealer as filler for gapping joints and excessive voids resulting from poor workmanship.

B. Do not apply insulation to equipment, while hot.

C. Do not insulate ASME stamps, or manufacturer's nameplate. Provide neatly beveled edge at interruptions of insulation.

END OF SECTION
SECTION 232100 – HYDRONIC SYSTEMS AND EQUIPMENT

PART 1 GENERAL

1.1 WORK INCLUDED:

A. Types of hydronic specialties specified in this section include the following:
   - Vent Valves
   - Flow Control Valves
   - Hydronic Piping
   - Water Relief Valves

1.2 QUALITY ASSURANCE:

A. Manufacturer's Qualifications: Firms regularly engaged in manufacture of hydronic piping products of types, materials, and sizes required, whose products have been in satisfactory use in similar service for not less than 5 years.

B. Codes and Standards:
   1. ASME Compliance: Fabricate and install hydronic piping in accordance with ASME B31.9 "Building Services Piping."
   2. CMC Compliance: Fabricate and install hydronic piping in accordance with IAPMO "California Mechanical Code."
   3. Welding materials and labor shall conform to ASME Code and applicable state labor regulations.
   4. Welders shall be fully qualified and certified by a state approved welding bureau. Each welder shall identify his work with a marking stamped on each weld joint of pipe.
   5. Copper brazing (including Medical Gas -Medical vacuum pipe and fittings:
      a. Certified yearly by P.I.P.E. or agency that meets AMS B2.2-85 brazing procedures, American Welding Society Standards.
      b. Show current brazing certificates upon request. Certification shall be copied and kept on file by Contractor for duration of the job and provided to Owner’s Representative to be kept on file by Owner’s Plant Operations and Maintenance Plumbing Supervisor.

1.3 SUBMITTALS:

A. Product Data: Submit manufacturer's technical product data and installation instructions for each type of hydronic specialty.
B. Record Drawings: At project closeout, submit Record Drawings of installed hydronic piping and piping products in accordance with requirements of Division 1.

C. Maintenance Data: Submit maintenance data and parts lists for hydronic piping materials and products. Include this data, product data, Shop Drawings, and Record Drawings in maintenance manual in accordance with requirements of Division 1.

PART 2 PRODUCTS

2.1 MATERIALS:
A. Provide piping materials and factory-fabricated piping products of sizes, types, pressure ratings, temperature ratings, and capacities as indicated. Provide materials and products complying with ASME B31.9 Code for Building Services Piping where applicable, base pressure rating on hydronic piping systems maximum design pressures or as specified. Provide sizes and types matching piping and equipment connections; provide fittings of materials which match pipe materials used in hydronic piping systems.

2.2 BASIC PIPES AND PIPE FITTINGS:
A. Provide pipes and pipe fittings complying with 230500 Basic Mechanical Materials and Methods section "Pipes and Pipe Fittings," in accordance with the following listing:

1. Air Vent Discharge Piping: Type-L, hard copper tubing with wrought copper solder joint fittings and 95 percent tin, 5 percent antimony solder.

2. Relief Valve Discharge and Vapor Vent Piping: Same as specified for cooling coil condensate drain piping, except that plugged fittings will not be required.

2.3 BASIC VALVES:
A. Provide valves complying with Section 230500 Basic Mechanical Materials and Methods Sections, in accordance with the following listing.

B. Balance Valves:

1. Shall be Armstrong, Victaulic TA, B & G Circuit Setter, or equal in design. Valve shall provide multi-turn, 360 degrees adjustment with a micrometer type indicator located on valve hand wheel. Valve handwheel shall have hidden memory feature which will provide a means for locking the valve in position after the system is balanced. Plug design valves are not acceptable. 90 degree turn adjustable valves are not acceptable.
2. 2 Inches and Smaller: Ball Valves

3. 2-1/2 Inches and Larger: Butterfly Valves

C. Air Vent Valves:

1. Manual air vents: At all high points, reheat coils, the air vent assemblies shall consist of a 1/4" sov and a 2" x 12" nipple air chamber with 1/4" tubing connected to the top. Attach a 1/4" globe valve with 3/4" hose connection at end of tubing, termination point to be within 6" of ceiling or access door or to nearest floor drain or as shown.

   a. Manual air vents shall be installed at high points of piping system where piping offsets more than 6" from horizontal to vertical. Air vent bleed valves shall be easily accessible within arm’s reach at ceiling access.

   b. Air vents shall have the drain line run to a floor drain or floor sink. Above ceiling reheats shall have the air vent drain line drop down to within 3" of the ceiling or access door with a shut off valve. Must be within arm’s reach.

2.4 WATER RELIEF VALVES:

A. Provide water relief valves as indicated, of size and capacity as selected by installer for proper relieving capacity, in accordance with ASME Boiler and Pressure Vessel Code.

B. Combined Pressure-Temperature Relief Valves: Bronze body, test lever, thermostat, complying with ANSI Z21.22 listing requirements for temperature discharge capacity. Provide temperature relief at 210 degrees F and pressure relief at 125 psi.

C. Pressure Relief Valves: Watts Series 740, or equal, bronze body, test lever, ASME rated. Provide pressure relief at 30 psi.

D. Manufacturers: Armtrol, Inc., Bell and Gossett ITT; Fluid Handling Division, Spirax Sarco, or equal.

PART 3 EXECUTION

3.1 INSPECTION:

A. Examine areas and conditions under which hydronic piping systems and specialties are to be installed. Do not proceed with work until unsatisfactory conditions have been corrected.

3.2 INSTALLATION OF VALVES:

A. Drain Valves: Install on each mechanical equipment item located to completely drain equipment for service or repair. Install at base of each riser, at base of each rise or drop in piping system, and elsewhere as indicated or required to completely drain hydronic piping system.

   1. Hose bibbs are not to be used as drain valves on low point drains, equipment, etc.

B. Check Valves: Install on discharge side of each pump and elsewhere as indicated.
3.3 EQUIPMENT CONNECTIONS:

A. Connect hydronic piping system to mechanical equipment as indicated, and comply with equipment manufacturer's instructions where not otherwise indicated. Install shutoff valve and union on supply and return; drain valve on drain connection.

1. Hose bibbs are not to be used as drain valves on low point drains, equipment, etc.

3.4 INSTALLATION OF HYDRONIC SPECIALTIES:

A. Balance Valves: Install balance valves on each hydronic terminal and elsewhere as indicated. After hydronic system balancing has been completed, mark each balance valve with stripe of yellow lacquer across body and stop plate to permanently mark final balanced position.

B. Vent Valves:

1. Manual air vents: At all high points, reheat coils, the air vent assemblies shall consist of a 1/4" sov and a 2" x 12" nipple air chamber with 1/4" tubing connected to the top. Attach a 1/4" globe valve with 3/4" hose connection at end of tubing, termination point to be within 6" of ceiling or access door or to nearest floor drain or as shown.

2. Automatic Vent Valves: Install automatic vent valves at top of each hydronic riser and elsewhere as indicated. Install shutoff valve between riser and vent valve, pipe outlet to suitable plumbing drain or as indicated.

C. Water Relief Valves: Pipe discharge to floor drain or floor sink. Comply with ASME Boiler and Pressure Vessel Code.

3.5 INSTALLATION OF CHEMICAL TREATMENT SYSTEM:

A. Comply with manufacturer's instructions for installation of chemical treatment system, except as otherwise indicated.

B. Piping shall be initially cleaned, before start-up of any equipment, with a suitable cleaning agent introduced into the piping system as recommended by the manufacturer. This treatment shall be circulated for not less than 24 hours, followed by flushing until neutral. Refer to care and cleaning procedure. Temporary circulating pumps shall be furnished by Contractor. Project pumps shall not be used for this purpose. Condenser water shall not be circulated until chemicals are introduced into the piping system. All portions of piping shall be cleaned. Provide all necessary pipe fittings and piping to allow this to occur. Where tees and crossovers are required provide with flanges to allow removal of temporary piping.

C. Provide test equipment to test conductivity by portable solids meter, range 9-2500 ppm; nitrite by drop test; pH in range of 5.5 to 8.5 by color comparator; alkalinity by titration.

D. Secure the services of a water treatment specialist who will perform the following work:

1. Supervise initial clean out of piping systems.
2. Make water analysis and establish chemical and water balance to prevent corrosion and scale formation in the recirculating water.

3. Instruct the Owner's personnel in the use and control of the chemical treatments supplied.

4. After completion of work, submit recirculating water analysis and certification to Owner's Representative that all work has been performed in accordance with Drawings and specifications.

5. Provide a one-year's supply of the required chemicals to the Owner at the completion of the job. Closed loop systems shall be inspected quarterly. Each inspection shall consist of analytical laboratory services to test the water. Test shall include microbiological testing and corrosion rate testing, and shall ensure proper water chemistry for systems. Provide report for each test to owner and engineer.

3.6 FIELD QUALITY CONTROL:

A. Test hydronic piping in accordance with testing requirements of 230500 Basic Mechanical Materials and Methods sections.

3.7 ADJUSTING AND CLEANING:

A. Clean, flush, and inspect hydronic piping systems in accordance with requirements of Division 230500 Basic Mechanical Materials and Methods sections.

B. Strainers: Remove all strainer baskets after system flush and prior to equipment start up.

3.8 CARE AND CLEANING:

A. Repair or replace broken, damaged, or otherwise defective parts, materials, and work. Leave entire work in condition satisfactory to Owner's Representative. At completion, carefully clean and adjust equipment and trim installed as part of this work. Leave systems and equipment in satisfactory operating condition.

B. After all equipment has been installed complete, the piping systems shall be cleaned as follows:

Add a solution of alkaline cleaner to the manufacturers recommended dosage. Circulate the system for 24 hours. Standby pumps should operate 50% of the circulation time, while all other pumps should operate 100% of the time. After 24 hour circulation time the system shall be drained, filled and operated repeatedly until clean and free of dirt and debris. Water quality should be that of incoming make-up water quality, and clarity should be clear. All strainers at pumps, control valves, and wherever else they are installed in the system shall have mesh elements removed, cleaned and/or replaced repeatedly until system can operate continuously without any dirt buildup on strainer elements.

Provide passivation by pretreatment chemical prior to filling. Circulate for 48 hours. Flush with water until proper phosphate levels are achieved. Removal and clean all strainers after passivation.
For closed loops add a corrosion inhibitor per manufacturers recommendations and dosage to maintain a Nitrite level (NO2) of the following:

Heating hot water loops: 500-800 ppm NO2

3.9 OPERATION TEST:

A. Test each piece of equipment to show that it will operate in accordance with indicated requirements.

3.10 CLEANING UP:

A. Upon completion of Work remove materials, equipment, apparatus, tools, and the like, and leave premises clean, neat, and orderly.

END OF SECTION
GENERAL NOTE:
BUSINESS ROOMS 1–17 ARE CURRENTLY UNDER RENOVATION. THE CONTRACTOR IS TO COORDINATE ACCESS TO THIS AREA WITH THE CONTRACTOR ON SITE.
BUSINESS EAST BUILDING
MECHANICAL HYDRONIC DEMOLITION FLOOR PLAN

(REFERENCE DRAWING M1.6 ADDENDUM 1)
GENERAL NOTE:
BUSINESS ROOMS 1–17 ARE CURRENTLY UNDER RENOVATION. THE CONTRACTOR IS TO COORDINATE ACCESS TO THIS AREA WITH THE CONTRACTOR ON SITE.

(N) 3/4" HWS&R CONNECT TO (E) RB-3

PRINT FINISH

11

(N) 1" HWS&R CONNECT TO (E) RB-4

(E) RB-2

(E) RB-3

OFFICE

12

(E) ANCHOR PIPES TO WALL

VEST

2

(E) 2"

STUDIO C.R.

10

(FILM PROC. 3

(E) RB-5

CORR. 7

1/2"

N) 3/4" HWS&R

(E) RB-4

FA

PROJECT:
COSUMNES RIVER COLLEGE
SCIENCE & BUSINESS HYDRONIC REPLACEMENT

LOS RIOS COMMUNITY COLLEGE DISTRICT
8401 CENTER PARKWAY
SACRAMENTO, CA, 95825

TURLEY & ASSOCIATES
MECHANICAL ENGINEERING GROUP, INC.
1914 S STREET
SACRAMENTO, CA 95811

(916) 325-1065
FAX: (916) 325-1075
Email: office@tuleyed.com

DATE
06-12-16

AD-5
MECHANICAL ROOM #1 NEW PLAN

(REFERENCE DRAWING M2.7, ADDENDUM 1)

PROJECT:
COSUMNES RIVER COLLEGE
SCIENCE & BUSINESS
HYDRONIC REPLACEMENT

LOS RIOS COMMUNITY COLLEGE
DISTRICT
8401 CENTER PARKWAY
SACRAMENTO, CA, 95825

DATE
06-12-16

AD-7
Of Sheets
(REFERENCE DRAWING M2.7, ADDENDUM 1)
PROJECB:  
COSUMNES RIVER COLLEGE  
SCIENCE & BUSINESS  
HYDRONIC REPLACEMENT

MECHHICAL ENGINEERING GROUP, INC.  
1914 S STREET  
SACRAMENTO, CA 95811  
FAX: (916) 325-1075  
Email: office@turleyeng.com

AD-12

MECHANICAL FLOOR PLAN

SCIENCE BUILDING 400

DATE
06-12-16

PROJECT:
COSUMNES RIVER COLLEGE
SCIENCE & BUSINESS
HYDRONIC REPLACEMENT

LOIS RO£ COMMUNITY COLLEGE
DISTRICT
8401 CENTER PARKWAY
SACRAMENTO, CA, 95825

TURLEY
& ASSOCIATES

SCIENCE BUILDING
MECHANICAL NEW ROOF PLAN

REFERENCE DRAWING M3.2, ADDENDUM 1

SCALE: 3/32"=1'-0"

SEE FOR PIPE THRU ROOF DETAIL TYP
POC
(E)SOVS
INSULATED (E)PIES

PROVIDE ALL NEW PIPING TO AHU COIL (N)VALVES, STRAINERS, CONTROL VALVE, AND FLEX CONNECTIONS

14" 24"

(N)1"HWS& HWR(D)

14" 41"

(E)3"HWS(TB)
(E)3"HWR(FB)

(E)3"CHWS&R

(N)3"HWS&R

(N)PIPE

EXPANSION LOOP
SCIENCE BUILDING
MECHANICAL NEW ROOF PLAN

SCALE: 3/32"=1'-0"

PROVIDE ALL NEW PIPING TO AHU COIL (N) VALVES, STRAINERS, CONTROL VALVE, AND FLEX CONNECTIONS

CONNECT (N) HWS & HWR TO (E) UNIT

PROVIDE ALL NEW PIPING TO AHU COIL (N) VALVES, STRAINERS, CONTROL VALVE, AND FLEX CONNECTIONS

REFERENCE DRAWING M3.2, ADDENDUM
PROVIDE ALL NEW PIPING TO AHU COIL (N) VALVES, STRAINERS, CONTROL VALVE, AND FLEX CONNECTIONS.