SECTION 15515

VALVES, HANGERS, AND SPECIALTIES

PART 1 GENERAL

1.01 SUMMARY

A. Related Sections:

1. 15090 - Supports, Anchors, and Seals.
2. 15410 - Piping (Plumbing).
3. 15510 - Piping (HVAC).
4. 15540 - Pumping Equipment (HVAC).
5. 15855 - Air Handling Units.
6. 15970 - HVAC Control System.
7. 15990 - Tests (HVAC).

1.02 REFERENCES


1.03 SUBMITTALS

A. Submit the following:

1. Thermometers and Pressure Gages: Catalog cuts, proposed range, and calibrated accuracy.
2. Strainers: Catalog cuts, pressure drop curves.
3. Pressure Relief and Reducing Valves: Catalog cuts; pressure range, and settings.
4. Air Vents: Catalog cuts.
5. Flexible Connectors: Catalog cuts.
6. All Valves: Catalog cuts, schedule of proposed installation locations, pressure ratings, and materials of construction.
7. Inserts: Catalog cuts and load tables.
8. Supports: Catalog cuts or drawings.
9. Anchors: Drawings and details of installation.
10. Water Flow Tube Station: Catalog cuts, pressure drop charts, and engineering information.
11. Expansion Tank: Shop drawings, catalog cuts of accessories and shop drawings of tank support.
12. Shop Drawings of support equipment.

PART 2 PRODUCTS

2.01 MANUFACTURERS
A. Valves:

1. Clow.
2. Chicago.
3. Crane.
4. DeZuric.
5. Grinnell.
6. Homestead.
7. Hammond.
8. Jenkins Lunkenheimer.
10. Milwaukee.
11. Nibco.
12. Stockham.

B. Expansion Tanks:

1. Taco.
2. Bell & Gossett.
3. Accepted equivalent.

2.02 VALVES.

A. General:

1. Gate and globe valves shall not be installed with the stem pointing downwards. Valves may be installed with the stem at or above a horizontal plane. Provide adequate clearance for stem rise.
2. Check valves may be installed either in the horizontal or vertical position. Non-spring loaded check valves shall only be installed in the vertical position when the flow is upwards.
3. Butterfly valves may be installed with the stem in any position. Whenever possible the stem shall be installed as outlined for gate and globe valves.
4. Provide all valves with a 1-1/2" diameter brass tag having 1/2" high black filled numbers and 1/4" high legend above, as manufactured by Seton or accepted equivalent.

a. Legend shall include abbreviations such as: PLMG, CW, HW, GAS, HVAC, etc.
b. Valve tag fasteners shall consist of No.6 brass beaded chain with brass "S" hooks. The use of color coded one piece nylon ties is acceptable instead of beaded chain fasteners. Brass "S" hooks are required with ties.
c. Record all valve tag numbers in as-built drawings and submit before requesting final payment.

5. Provide ease of access to valve handwheel or lever to maintenance personnel.
   a. Valves installed above a ceiling shall have the stem placed 15 degrees above the horizontal position whenever possible.
   b. Provide colored thumbtack indexes at all ceiling tiles where valves are installed directly above.
   c. Index all colored thumbtacks in the as-built drawings.

6. Provide chain actuators for all valves in mechanical equipment rooms installed at a centerline height at or above 7 feet above the floor.
   a. Actuators shall consist of a cast iron sprocket rim attached to the valve, malleable iron chain guide, and chain of sufficient length to descend to a floor height of not more than 3'-6".
   b. Valves larger than 12 inches and valves not suitable for chain actuators shall be provided with electrical actuators, motors, and switches.
   c. Install switches where directed.

B. Gate Valves:

1. To 2":
   a. Class 150, bronze, union bonnet rising stem, inside screw, solid wedge disc, non-asbestos packing, soldered ends.
   b. Manufacturers:
      1) Nibco S-134.
      2) Milwaukee 1169.
      3) Accepted equivalent.

2. 2-1/2" and above:
   a. Class 125, outside screw and yoke, iron body, bronze trim, (IBBM), rising stem, solid bronze wedge disc up to size 3-1/2" and cast iron with bronze wedge face rings in larger sizes, non-asbestos packing, flanged ends.
   b. Manufacturers:
1) Nibco F-617-0.
2) Milwaukee F-2885.
3) Accepted equivalent.

C. Globe and Angle Valves:

1. To 2"
   a. Class 150, bronze, union bonnet rising stem, inside screw, integral seat, renewable Teflon discs, non-asbestos packing, soldered or threaded ends.
   b. Manufacturers:
      1) Nibco S-235-Y, Milwaukee 590-T, or accepted equivalent for globe.
      2) Nibco T-335-Y, Milwaukee 595-T, or accepted equivalent for angle.

2. 2-1/2" & above:
   a. Class 125, bolted bonnet, outside screw, iron body, bronze trim, (IBBM), rising stem, renewable bronze seat ring and disc up to 3" or 4" size and iron disc with bronze disc face rings in larger sizes, non-asbestos body gasket, flanged ends.
   b. Manufacturers:
      1) Nibco F-718-B.
      2) Milwaukee F-2981.
      3) Accepted equivalent.

D. Check Valves:

1. To 2"
   a. Class 125 or Class 200, bronze, screwed bonnet, Y pattern, renewable Teflon discs, soldered or threaded ends.
   b. Manufacturers:
      1) Nibco T/S-235-Y.
      2) Grinnell 3300.
      3) Milwaukee 590-S.
      4) Accepted equivalent.

2. 2-1/2" & above:
   a. Class 125, silent, non-slam type spring loaded, iron body, bronze seat and plug, single disc,
stainless steel spring, guided disc top and bottom, wafer or lug type.

b. Manufacturers:

1) Muessco 105 AP.
2) Milwaukee 1400.
3) Accepted equivalent.

E. Butterfly Valves:

1. 2-1/2" to 6":

a. 200 psi WOG, cast iron body with extended neck for insulated piping, lugged, with lugs drilled and tapped according to ANSI B-16, silicon bronze or aluminum bronze disc, EPDM seat, and 416 stainless steel stem.

1) Valve shall comply with API-609 and MSS-SP-67.
2) Provide valves with lever-lock operator having position lock and 10 degree balancing notches.
3) Provide a memory stop capable of allowing valve closing and reopening to previously balanced position.

b. Manufacturers:

1) Nibco.
2) Milwaukee CL-223E with options and accessories.
3) Accepted equivalent.

2. 8" and above:

a. 200 psi WOG, sizes 2"-12" and 150 psi WOG for larger sizes. Cast iron body with extended neck for insulated piping, lugged, with lugs drilled and tapped according to ANSI B-16, silicon bronze or aluminum bronze disc, EPDM seat, and 416 stainless steel stem. Valve shall comply with API-609 and MSS-SP-67. Provide valves with hand cranked heavy duty weatherproof gear operator with indicator and adjustable stops at all locations.

b. Manufacturers:

1) Nibco.
2) Milwaukee CL-323E or ML-323E with options and accessories.
3) Accepted equivalent.
F. Balancing Valves:

1. Up to 2":
   a. 175 lb. WOG, non-lubricated, eccentric plug type, nickel seat, semi-steel body, neoprene or Teflon coated resilient plug, Buna filled Teflon U-ring seal or Buna (Vee) packing. Provide memory stop and lever handle.
   b. Manufacturers:
      1) DeZuric Series 100.
      2) Accepted equivalent.

G. Ball Valves:

1. Plumbing: Allowed only for balancing service in domestic hot water return.
2. HVAC: Allowed only for shut-off, not for balancing service. Provide 3 inch stem extensions for insulated line.
3. Porting: No reduced ports shall be acceptable in any ball valve.
4. Up to 2":
   a. Class 150, 400/600 psi WOG, full port, three piece construction, blowout-proof stem, non-asbestos packing, bronze body, silicone bronze stem, bronze/brass/chrome plated ball, Teflon resilient seat, and EPDM O ring seal.
   b. Manufacturers:
      1) Nibco T/S-595-Y.
      2) Hammond 8604/8601.
      3) Milwaukee BA-300SS/350S.
      4) Accepted equivalent.

2.03 HOSE BIBBS

A. Interior:

1. Concealed Supply:
   a. Flanged, all brass, chrome plated, 3/4" angle hose valve, with vacuum breaker.
   b. Manufacturers: No.952 by Chicago Faucet or accepted equivalent.
   c. Provide isolation valve in branch.
2. Exposed Supply:
   a. All brass, 3/4" angle hose valve, with vacuum breaker.
   b. No.998 by Chicago Faucet or accepted equivalent.
   c. Strainers:

3. 3/4":
   a. "Y" type, 20 mesh monel screen, iron body, 250 lb. w.s.p. with blow-off outlet and plug, screwed ends. Muessco #11, or accepted equivalent.

4. 2-1/2" to 4":
   a. "Y" type, 1/8", iron flanged body, 125 lb. w.s.p. with blow-off tapping and plug, Muessco #751 or accepted equivalent. Basket type, cast iron flanged body, 125 lb. WSP, with blow-off tapping and plug.

5. 4" and above:
   a. "Basket" type, heavy gage perforated brass basket, 0.057" diameter perforations in sizes to 4 inches and 0.125" diameter perforations in sizes larger than 4 inches. Muessco #165 or accepted equivalent.

B. Flexible Connectors:
   1. All sizes:
      a. Full line size with floating flanges. Rated 150 psi at 180 degrees F., wire reinforced, double arched, and with control rods and rubber washers. Mason Industries or accepted equivalent.

C. Pressure Relief Valves:
   1. 3/4":
      a. Brass body, micro finished bevel for seats, cadmium plated springs, manual chilled lift ring, ASME Std. Bell and Gossett or water accepted equivalent.

D. Pressure Reducing Valves:
   1. 3/4":
      a. Brass body and brass working parts with built-in
strainer, 125 W.S.P. Bell and Gossett or accepted equivalent.

E. Air Vents:

1. Provide air vents at high points in chilled water systems.
2. Vents shall be automatic type unless otherwise indicated.
3. Automatic vents shall be Metraflex Model MU15 or accepted equivalent.

F. Thermometers:

1. Industrial, mercury filled, glass thermometers with 9 inch scale, "V" shape, and adjustable angle separable socket well.
2. Operating temperature shall display at midpoint of thermometer range.
3. Accuracy shall be ±0.5 degrees F.
4. Casings shall be brass or aluminum.

G. Thermometer Wells:

1. Brass construction with cap and chain.
3. Provide extended neck wells in insulated piping.
4. Provide tees at lines 3 inches or smaller for thermometer wells.

H. Pressure Gages:

1. Standard depth, cast aluminum, black finished, chrome plated close type ring, clear glass window, bronze bourdon tube, precision movement and ±0.5 percent accuracy.
2. Gage shall have a minimum 4-1/2" diameter face and with the operating pressure displaying at the middle range of the scale. Bottom connection shall be at least 1/2" diameter.

I. Gage valves:
1. Brass, 1/2" needle valve type.
2. Manufacturers: H.O. Trerice, Model No.735-2 or accepted equivalent.
3. Provide pressure snubbers at gage cocks manufactured by H.O. Trerice, Model 872 or accepted equivalent of Marshalltown, Ashcroft, or Taylor.

J. Dielectric Pipe Fittings:
1. Dielectric pipe fittings shall consist of insulators, insulating gasket, pipe connector and nut or flange as required.
2. Pipe connectors shall be suitable for soldered, screwed, or welded joints as required.
3. Dielectric unions shall be rated at 250 psi and cast iron flange unions at 175 psi.
4. Dielectric fitting shall be plated according to Federal Specifications of 0.005".
5. Fittings shall be as manufactured by Epco.

K. Water Flow Sensors:
1. As manufactured by Annubar ANR-75, stainless steel.
2. Instrument connections shall be No.C-22.
3. 1/4" valves on 1-3/8" square head.
4. Valve rating shall be maximum 5,000 psi at 100 degrees F.
5. Flow sensor in steel pipe shall be weld nipple mounted.
6. Flow sensor in PVC pipe shall be saddle mounted.
7. Manufacturers: Dietrich Standard Corp or accepted equivalent.

L. In-line type air purger with tappings for an air vent and a makeup water line as indicated, shall be Amtrol, 125 psi, flanged, cast iron.

M. Provide and install immersion wells and pressure taps as required for automatic control system.

2.04 EXPANSION TANKS

A. Size, capacity, and arrangement as shown on Construction Documents.

B. Designed, constructed, and stamped according to ASME Code for 125 psig.

C. Welded black steel construction, rustproof coated, with base mount for vertical installation.
D. Provided with lifting ring and connection tappings.
E. Sealed in elastomer diaphragm suitable for 240 degrees.
F. Built-in air charger valve. Precharge tank to 20 psi.

2.05 PIPE HANGERS AND SUPPORTS

A. Provide hangers, supports, and supplementary steel as required for the different applications.

B. Inserts, Hangers, Rods, and Clamps: Fig. numbers used refer to Grinnell, Fee and Mason, or Michigan Hanger Co.

1. Inserts: (Galvanized or stainless steel except as noted.)
   a. Universal concrete insert, Fig.282.
   b. Wedge type concrete insert, Fig.281.
   c. Expansion case, Fig.117.

2. Clamps:
   a. UFS beam clamp with weldless eye nut, Fig.292, clamp size 1, rod size 3/4".
   b. C-clamp with retaining clip, Fig.87.
   c. 1 beam clamp, Fig.131.
   d. Universal side 1 beam clamp, Fig.225.
   e. C-clamp, copper finish, Fig.CT-88.

3. Hangers: Use adjustable clevis type hangers as specified. Hangers for insulated pipes shall have a diameter large enough to include insulation and a protection shield shall be installed with each hanger.
   a. Cast iron pipe: Fig.590.
   b. Copper tubing: Fig.CT-65.
   c. Insulated steel pipe: Fig.300.
   d. Uninsulated steel pipe: Fig.260.
   e. Trapeze.

4. Rods: Continuous thread, Fig.146. Sizes shall be as specified.

5. Riser Clamps:
   a. Black steel, Fig.261.
   b. Plastic coated, Fig.261C.
   c. Copper finish, Fig.CT121.
C. Horizontal Steel Piping Support Spacing and Rod Size:

<table>
<thead>
<tr>
<th>Pipe Size</th>
<th>Rod Diameter</th>
<th>Maximum Spacing</th>
</tr>
</thead>
<tbody>
<tr>
<td>Up to 1-1/4&quot;</td>
<td>3/8&quot;</td>
<td>8 feet</td>
</tr>
<tr>
<td>1-1/2&quot; &amp; 2&quot;</td>
<td>3/8&quot;</td>
<td>10 feet</td>
</tr>
<tr>
<td>2-1/2&quot; &amp; 3&quot;</td>
<td>1/2&quot;</td>
<td>12 feet</td>
</tr>
<tr>
<td>4&quot; &amp; 5&quot;</td>
<td>5/8&quot;</td>
<td>12 feet</td>
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<tr>
<td>6&quot;</td>
<td>3/4&quot;</td>
<td>15 feet</td>
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<td>8&quot; &amp; 12&quot;</td>
<td>7/8&quot;</td>
<td>18 feet</td>
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<td>14&quot; &amp; 16&quot;</td>
<td>1&quot;</td>
<td>24 feet</td>
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</table>

D. Horizontal Copper Piping:

<table>
<thead>
<tr>
<th>Pipe Size</th>
<th>Rod Diameter</th>
<th>Maximum Spacing</th>
</tr>
</thead>
<tbody>
<tr>
<td>Up to 1-1/2&quot;</td>
<td>3/8&quot;</td>
<td>6 feet</td>
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<td>2&quot;</td>
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</tr>
<tr>
<td>2-1/2&quot;, 3&quot;, &amp; 4&quot;</td>
<td>1/2&quot;</td>
<td>8 feet</td>
</tr>
</tbody>
</table>

E. Insulation Protection Shield: Fig.167.


PART 3 EXECUTION

3.01 INSTALLATION

A. Provide shut-off valves at inlets and outlets of equipment and branch connections to mains and as shown on Construction Documents.

B. Final connections to apparatus, equipment, automatic control valves, and pressure reducing valves shall be made with flanges or unions between shut-off valve and connection.

C. Connections to cooling coils and refrigeration machines shall have flanges or unions next to equipment to allow tube removal without extensive dismantling of piping.

D. Strainers shall be full line size and shall be full size valved for servicing. Strainers shall be installed upstream of automatic control valves and other locations as shown on Construction Documents.

E. Pressure Relief Valves: Provide at cooling coil side of
shut-off valves and where shown on Construction Documents.

F. Flexible Connectors: Provide between vibrating equipment and piping.

G. Location of Valves and Chain Operators:
   1. Install valves to be accessible for operation and free from interferences when operated.
   2. Position so leakage will not contact any electrical equipment located below.
   3. Provide valve chain operators for valves 4 inches and larger if the valve handle is more than 6 feet above the operating equipment room floor level.

H. Thermometer Wells: Provide for thermometers and at the inlet and outlet of each cooling coil, next to sensing bulbs of controllers and remote temperature indicators, and as shown on Construction Documents.

I. Thermometers: Provide at the inlet and outlet of each air handling unit coil bank and as shown on Construction Documents.

J. Pressure Gages: Provide as shown on Construction Documents and at following locations:
   1. At suction and discharge of circulating pumps.
   2. At inlet and outlet of evaporator and condenser.
   3. At makeup water inlet to expansion tanks and equipment.

K. Pipe Hangers and Supports:
   1. Provide adjustable hangers, inserts, brackets, rolls, clamps, and supplementary steel as required for proper support of pipe lines.
   2. Design hangers to allow for expansion and contraction of pipe lines and of adequate size to allow covering to run continuously through hangers.
   3. Support piping independently of equipment.
   4. Coordinate location of hangers with light fixtures.
   5. Wire brush steel or iron supports and prepare surfaces under this section for painting.
   6. Install plastic pipe loose to allow for contraction and expansion.
   7. Hangers for PVC piping in storage tanks do not need rollers and hangers can be shop fabricated from stainless steel strap and anchor bolts.
   8. Pipes supported by trapeze hangers and not mounted on
pipe rollers shall be secured to the trapeze with pipe clamps or "U" bolts.

9. Hangers shall be placed at each change of direction, within 1 foot of valves and other appurtenances installed in horizontal piping and not more than 3 feet from end of each branch runout.

10. Special Supports: Provide clamps, hangers, and supports according to equipment manufacturer's recommendations.

11. Supports of wire, rope, wood, chain, strap, perforated bar, or any other makeshift devices are not allowed.

12. Where overhead construction does not allow fastening hanger rods in required locations, provide additional steel framing as required.

13. Refer to "Vibration Isolation" Section for supports requiring vibration isolators.

14. Maximum loading on inserts shall not exceed 75 percent of catalog rating.

15. Floor supports, wall brackets, and expansion tank supports as shown on Construction Documents or as required to support equipment. Submit shop drawings.

16. Buckling of piping due to inadequate provision for expansion shall be Contractor's responsibility. Piping shall be properly guided between expansion joints and anchor points.

L. Expansion Tanks:

1. Suspended from structure (horizontal type).
2. Connect to makeup water piping provided under plumbing work.
3. Pipe relief valve to nearest drain.

M. Water Flow Sensors: Install water flow tube stations according to manufacturer's published recommendations and as shown on Contract Documents.

N. Dielectric Fittings: Provide dielectric fittings between piping of dissimilar metals.

END OF SECTION