SECTION 23 05 19
METERS AND GAGES FOR HVAC PIPING

PART 1 - GENERAL

1.01 SUMMARY

A. Section Includes:
1. Liquid-in-glass thermometers.
2. Thermowells.
3. Dial-type pressure gages.

1.02 SUBMITTALS

A. Product Data: For each type of product indicated.

PART 2 - PRODUCTS

2.01 LIQUID-IN-GLASS THERMOMETERS

A. Metal-Case, Industrial-Style, Liquid-in-Glass Thermometers:
1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
   a. Flo Fab Inc.
   b. Miljoco Corporation.
   c. Palmer Wahl Instrumentation Group.
   d. Tel-Tru Manufacturing Company.
   e. Trerice, H. O. Co.
   f. Weiss Instruments, Inc.
   g. Winters Instruments - U.S.
2. Standard: ASME B40.200.
3. Case: Cast aluminum; 7-inch (178-mm) nominal size unless otherwise indicated.
4. Case Form: Adjustable angle unless otherwise indicated.
5. Tube: Glass with magnifying lens and blue or red organic liquid.
6. Tube Background: Nonreflective aluminum with permanently etched scale markings graduated in deg F.
7. Window: Glass.
8. Stem: Aluminum and of length to suit installation.
9. Connector: 1-1/4 inches (32 mm), with ASME B1.1 screw threads.
10. Accuracy: Plus or minus 1 percent of scale range or one scale division, to a maximum of 1.5 percent of scale range.

2.02 THERMOWELLS

A. Thermowells:
1. Standard: ASME B40.200.
2. Description: Pressure-tight, socket-type fitting made for insertion into piping tee fitting.

3. Material for Use with Copper Tubing: CNR
4. Material for Use with Steel Piping: CRES.
5. Type: Stepped shank unless straight or tapered shank is indicated.
6. External Threads: NPS 1/2, NPS 3/4, or NPS 1, (DN 15, DN 20, or NPS 25,) ASME B1.20.1 pipe threads.
7. Internal Threads: 1/2, 3/4, and 1 inch (13, 19, and 25 mm), with ASME B1.1 screw threads.
8. Bore: Diameter required to match thermometer bulb or stem.
9. Insertion Length: Length required to match thermometer bulb or stem.
10. Lagging Extension: Include on thermowells for insulated piping and tubing.
11. Bushings: For converting size of thermowell's internal screw thread to size of thermometer connection.

B. Heat-Transfer Medium: Mixture of graphite and glycerin.

2.03 PRESSURE GAGES

A. Direct-Mounted, Metal-Case, Dial-Type Pressure Gages:
1. Manufacturers: Subject to compliance with requirements, provide products by one of the following
   a. Ashcroft Inc.
   b. Flo Fab Inc.
   c. Miljoco Corporation.
   d. Palmer Wahl Instrumentation Group.
   e. Tel-Tru Manufacturing Company.
   f. Trerice, H. O. Co.
   g. Watts Regulator Co.; a div. of Watts Water Technologies, Inc.
   h. Weiss Instruments, Inc.
   i. Winters Instruments - U.S.
2. Standard: ASME B40.100.
3. Case: Liquid-filled, Sealed type(s); cast aluminum or drawn steel; 4-1/2-inch nominal diameter.
4. Pressure-Element Assembly: Bourdon tube unless otherwise indicated.
5. Pressure Connection: Brass, with NPS 1/4, ASME B1.20.1 pipe threads and bottom-outlet type unless back-outlet type is indicated.
6. Movement: Mechanical, with link to pressure element and connection to pointer.
7. Dial: Nonreflective aluminum with permanently etched scale markings graduated in psi.
8. Pointer: Dark-colored metal.
9. Window: Glass or plastic.
10. Ring: Metal.
11. Accuracy: Grade A, plus or minus 1 percent of middle half of scale range.

PART 3 - EXECUTION

3.01 INSTALLATION

A. Install thermowells with socket extending to center of pipe and in vertical position in piping tees.

B. Install thermowells of sizes required to match thermometer connectors. Include bushings if required to match sizes.

C. Install thermowells with extension on insulated piping.

D. Fill thermowells with heat-transfer medium.

E. Install direct-mounted thermometers in thermowells and adjust vertical and tilted positions.

F. Install direct-mounted pressure gages in piping tees with pressure gage located on pipe at the most readable position.

G. Install thermometers in the following locations:
   1. Inlet and outlet of each hydronic boiler.
   2. As shown on drawings.

H. Install pressure gages in the following locations:
   1. Suction and discharge of each pump.
   2. As shown on drawings.

3.02 ADJUSTING

A. After installation, calibrate meters according to manufacturer's written instructions.

B. Adjust faces of meters and gages to proper angle for best visibility.

3.03 THERMOMETER SCALE-RANGE SCHEDULE

A. Scale Range for Heating, Hot-Water Piping: 20 to 240 deg F (0 to 150 deg C).

3.04 PRESSURE-GAGE SCHEDULE

A. Pressure gages at suction and discharge of each pump shall be the following:
   1. Liquid-filled, direct-mounted, metal case.

3.05 PRESSURE-GAGE SCALE-RANGE SCHEDULE

A. Scale Range for Heating, Hot-Water Piping: 0 to 100 psi.

END OF SECTION 23 05 19