

SECTION 230519 - METERS AND GAGES FOR HVAC PIPING

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Bimetallic-actuated thermometers.
2. Liquid-in-glass thermometers.
3. Thermowells.
4. Dial-type pressure gages.
5. Gage attachments.

1.2 ACTION SUBMITTALS

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

1.3 INFORMATIONAL SUBMITTALS

- A. Product certificates.

1.4 CLOSEOUT SUBMITTALS

- A. Operation and maintenance data.

PART 2 - PRODUCTS

2.1 BIMETALLIC-ACTUATED THERMOMETERS

- A. Standard: ASME B40.200.
- B. Case: Sealed type(s); stainless steel with 3-inch (76-mm) nominal diameter.
- C. Dial: Nonreflective aluminum with permanently etched scale markings and scales in deg F and deg C.
- D. Connector Type(s): Union joint, adjustable angle, with unified-inch screw threads.
- E. Connector Size: 1/2 inch (13 mm), with ASME B1.1 screw threads.
- F. Stem: 0.25 or 0.375 inch (6.4 or 9.4 mm) in diameter; stainless steel.
- G. Window: Plain glass.

- H. Ring: Stainless steel.
- I. Element: Bimetal coil.
- J. Pointer: Dark-colored metal.
- K. Accuracy: Plus or minus 1 percent of scale range.

2.2 LIQUID-IN-GLASS THERMOMETERS

A. Metal-Case, Industrial-Style, Liquid-in-Glass Thermometers:

- 1. Standard: ASME B40.200.
- 2. Case: Cast aluminum; 7-inch (178-mm) nominal size unless otherwise indicated.
- 3. Case Form: Adjustable angle unless otherwise indicated.
- 4. Tube: Glass with magnifying lens and blue organic liquid.
- 5. Tube Background: Nonreflective aluminum with permanently etched scale markings graduated in deg F and deg C.
- 6. Window: Glass.
- 7. Stem: Aluminum and of length to suit installation.
 - a. Design for Thermowell Installation: Bare stem.
- 8. Connector: 1-1/4 inches (32 mm), with ASME B1.1 screw threads.
- 9. Accuracy: Plus or minus 1 percent of scale range or one scale division, to a maximum of 1.5 percent of scale range.

2.3 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 or CUNI.
- 4. Material for Use with Steel Piping: CSA.
- 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.

2.4 PRESSURE GAGES

- A. Direct-Mounted, Metal-Case, Dial-Type Pressure Gages:
 - 1. Standard: ASME B40.100.
 - 2. Case: Sealed type(s); cast aluminum or drawn steel; 4-1/2-inch (114-mm) nominal diameter.
 - 3. Pressure-Element Assembly: Bourdon tube unless otherwise indicated.
 - 4. Pressure Connection: Brass, with NPS 1/4 or NPS 1/2 (DN 8 or DN 15), ASME B1.20.1 pipe threads and bottom-outlet type unless back-outlet type is indicated.
 - 5. Movement: Mechanical, with link to pressure element and connection to pointer.
 - 6. Dial: Nonreflective aluminum with permanently etched scale markings graduated in psi and kPa.
 - 7. Pointer: Dark-colored metal.
 - 8. Window: Glass.
 - 9. Ring: Metal.
 - 10. Accuracy: Grade B, plus or minus 2 percent of middle half of scale range.

2.5 GAGE ATTACHMENTS

- A. Snubbers: ASME B40.100, brass; with NPS 1/4 or NPS 1/2 (DN 8 or DN 15), ASME B1.20.1 pipe threads and piston-type surge-dampening device. Include extension for use on insulated piping.
- B. Valves: Brass or stainless-steel needle, with NPS 1/4 or NPS 1/2 (DN 8 or DN 15), ASME B1.20.1 pipe threads.

PART 3 - EXECUTION

3.1 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 valve and snubber in piping for each pressure gage for fluids (except steam).

- H. Install thermometers in the following locations:
 - 1. Inlet and outlet of each hydronic zone.
 - 2. Inlet and outlet of each hydronic boiler.
 - 3. Inlet and outlet of each hydronic coil in air-handling units.
 - 4. Two inlets and two outlets of each hydronic heat exchanger.
 - 5. Inlet and outlet of each thermal-storage tank.
- I. Install pressure gages in the following locations:
 - 1. Discharge of each pressure-reducing valve.
 - 2. Suction and discharge of each pump.
 - 3. Distribution return side of boiler(s)

3.2 CONNECTIONS

- A. Install meters and gages adjacent to machines and equipment to allow service and maintenance of meters, gages, machines, and equipment.

3.3 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.

3.4 THERMOMETER SCHEDULE

- A. Thermometers at inlet and outlet of each hydronic zone shall be one of the following:
 - 1. Sealed, bimetallic-actuated type.
 - 2. Industrial-style, liquid-in-glass type.
- B. Thermometers at inlet and outlet of each hydronic boiler shall be one of the following:
 - 1. Sealed, bimetallic-actuated type.
 - 2. Industrial-style, liquid-in-glass type.
- C. Thermometers at inlet and outlet of each hydronic coil in air-handling units and built-up central systems shall be one of the following:
 - 1. Sealed, bimetallic-actuated type.
 - 2. Industrial-style, liquid-in-glass type.
- D. Thermometers at inlets and outlets of each hydronic heat exchanger shall be one of the following:
 - 1. Sealed, bimetallic-actuated type.
 - 2. Industrial-style, liquid-in-glass type.

- E. Thermometers at inlet and outlet of each thermal-storage tank shall be one of the following:
 - 1. Sealed, bimetallic-actuated type.
 - 2. Industrial-style, liquid-in-glass type.
- F. Thermometer stems shall be of length to match thermowell insertion length.

3.5 THERMOMETER SCALE-RANGE SCHEDULE

- A. Scale Range for Heating, Hot-Water Piping: 0 to 250 deg F and 0 to 150 deg C.

3.6 PRESSURE-GAGE SCHEDULE

- A. Pressure gages at discharge of each pressure-reducing valve shall be the following:
 - 1. Sealed Solid-front, pressure-relief, direct-mounted, metal case.
- B. Pressure gages at suction and discharge of each pump shall be the following:
 - 1. Sealed Solid-front, pressure-relief, direct-mounted, metal case.

3.7 PRESSURE-GAGE SCALE-RANGE SCHEDULE

- A. Scale Range for Heating, Hot-Water Piping: 0 to 160 psi and 0 to 1100 kPa.

END OF SECTION 230519