

SECTION 230519

METERS AND GAGES FOR HVAC PIPING

PART 1 - GENERAL

1.1 STIPULATIONS

- A. The specifications sections "General Conditions of Contract", "Special Conditions", and "Division 1 – General Requirements" form a part of this section by this reference thereto, and shall have the same force and effect as if printed herewith in full.

1.2 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.3 SUMMARY

- A. Section Includes:
 - 1. Thermometers
 - 2. Pressure Gages
 - 3. Test plugs.
 - 4. Sight flow indicators.
 - 5. Flowmeters.
- B. Related Sections:
 - 1. Division 23 Section "Facility Natural-Gas Piping" for gas meters.
 - 2. Division 23 Section "Steam and Condensate Heating Piping" for steam and condensate meters.

1.4 SUBMITTALS

- A. Product Data: For each type of product indicated.
- B. Wiring Diagrams: For power, signal, and control wiring.
- C. Product Certificates: For each type of meter and gage, from manufacturer.
- D. Operation and Maintenance Data: For meters and gages to include in operation and maintenance manuals.

PART 2 - PRODUCTS

2.1 METAL-CASE, LIQUID-IN-GLASS THERMOMETERS

- A. Manufacturers: Subject to compliance with requirements, provide products by one the following:
 - 1. Weksler Instruments Operating Unit; Dresser Industries; Instrument Div.
 - 2. Miljoco Corporation
 - 3. Terice, H.O. Co.
 - 4. Weiss Instruments, Inc.
- B. Case: Die-cast aluminum or brass, chrome-plated brass, 9 inches long.
- C. Tube: Red or blue reading, organic-liquid filled, with magnifying lens.
- D. Tube Background: Satin-faced, nonreflective aluminum with permanently etched scale markings.
- E. Window: Plastic.
- F. Connector: Adjustable type, 180 degrees in vertical plane, 360 degrees in horizontal plane, with locking device, rigid, straight type, or rigid, angle type.
- G. Stem: Copper-plated steel, aluminum, or brass for thermowell installation and of length to suit installation.
- H. Accuracy: Plus or minus 1 percent of range or plus or minus 1 scale division to maximum of 1.5 percent of range.

2.1 PRESSURE GAGES

- A. Manufacturers: Same as manufacturer of thermometer being used.
- B. Direct-Mounting, Dial-Type Pressure Gages: Indicating-dial type complying with ASME B40.100.
 - 1. Case: Dry, metal, 6-inch diameter.
 - 2. Pressure-Element Assembly: Bourdon tube, unless otherwise indicated.
 - 3. Pressure Connection: Brass, NPS 1/4, bottom-outlet type unless back-outlet type is indicated.
 - 4. Movement: Mechanical, with link to pressure element and connection to pointer.
 - 5. Dial: Satin-faced, nonreflective aluminum with permanently etched scale markings.
 - 6. Pointer: Red metal.
 - 7. Window: Plastic.
 - 8. Ring: Metal.
 - 9. Accuracy: Grade A, plus or minus 1 percent of middle half scale.
 - 10. Vacuum-Pressure Range: 30-in. Hg of vacuum to 15 psig of pressure.

11. Range for Fluids under Pressure: Two times operating pressure.
12. Remote-Mounting, Dial-Type Pressure Gages: ASME B40.100, indicating-dial type.
13. Case: Dry type, drawn steel or cast aluminum, 6-inch diameter with holes for panel mounting.
14. Pressure-Element Assembly: Bourdon tube, unless otherwise indicated.
15. Pressure Connection: Brass, NPS 1/4, bottom-outlet type unless back-outlet type is indicated.
16. Movement: Mechanical, with link to pressure element and connection to pointer.
17. Dial: Satin-faced, nonreflective aluminum with permanently etched scale markings.
18. Pointer: Red or other dark-color metal.
19. Window: Plastic.
20. Ring: Stainless steel.
21. Accuracy: Grade A, plus or minus 1 percent of middle half scale.
22. Vacuum-Pressure Range: 30-in. Hg of vacuum to 15 psig of pressure.
23. Range for Fluids under Pressure: Two times operating pressure.
24. Provide single gauge for pump installations mounted to a 4-port trumpet valve
25. Pressure-Gage Fittings:
26. Valves: NPS 1/4 brass or stainless-steel needle type.
27. Syphons: NPS 1/4 coil of brass tubing with threaded ends.
28. Snubbers: ASME B40.5, NPS 1/4 brass bushing with corrosion-resistant, porous-metal disc of material suitable for system fluid and working pressure.

C. Pressure-Gage Fittings:

1. Valves: NPS 1/4 brass or stainless-steel needle type.
2. Syphons: NPS 1/4 coil of brass tubing with threaded ends.
3. Snubbers: ASME B40.5, NPS 1/4 brass bushing with corrosion-resistant, porous-metal disc of material suitable for system fluid and working pressure.

2.2 TEST PLUGS

- A. Description: Corrosion-resistant brass or stainless-steel body with core inserts and gasketed and threaded cap, with extended stem for units to be installed in insulated piping.
- B. Minimum Pressure and Temperature Rating: 500 psig at 200 deg F.
- C. Core Inserts: One or two self-sealing rubber valves.
 1. Insert material for air, water, oil, or gas service at 20 to 200 deg F shall be CR.
 2. Insert material for air or water service at minus 30 to plus 275 deg F shall be EPDM.
- D. Test Kit: Furnish one test kit containing one pressure gage and adaptor, one thermometer, and carrying case. Pressure gage, adapter probes, and thermometer

sensing elements shall be of diameter to fit test plugs and of length to project into piping.

1. Pressure Gage: Small bourdon-tube insertion type with 2-to-3-inch diameter dial and probe. Dial range shall be 0 to 200 psig.
2. High-Range Thermometer: Small bimetallic insertion type with 1-to-2-inch diameter dial and tapered-end sensing element. Dial ranges shall be 0 to 220 deg F
3. Carrying case shall have formed instrument padding.

2.3 SIGHT FLOW INDICATORS

- A. Description: Piping inline-installation device for visual verification of flow.
- B. Construction: Bronze or stainless-steel body, with sight glass and ball, flapper, or paddle wheel indicator, and threaded or flanged ends.
- C. Minimum Pressure Rating: 150 psig.
- D. Minimum Temperature Rating: 300 deg F.
- E. End Connections for NPS 2 and Smaller: Threaded.
- F. End Connections for NPS 2-1/2 and Larger: Flanged.

2.4 FLOWMETERS

- A. Orifice Flowmeters:
 1. Description: Flowmeter with sensor, hoses or tubing, fittings, valves, indicator, and conversion chart.
 2. Flow Range: Sensor and indicator shall cover operating range of equipment or system served.
 3. Sensor: Wafer-orifice-type, calibrated, flow-measuring element; for installation between pipe flanges.
 - a. Design: Differential-pressure-type measurement for gas, oil, steam, or water.
 - b. Construction: Cast-iron body, brass valves with integral check valves and caps, and calibrated nameplate.
 - c. Minimum Pressure Rating: 300 psig.
 - d. Minimum Temperature Rating: 250 deg F.
 4. Permanent Indicators: Meter suitable for wall or bracket mounting, calibrated for connected sensor and having 6-inch diameter, or equivalent, dial with fittings and copper tubing for connecting to sensor.
 - a. Scale: Gallons per minute.

- b. Accuracy: Plus, or minus 1 percent between 20 and 80 percent of scale range.
- 5. Portable Indicators: Hand-held, differential-pressure type, calibrated for connected sensor and having two 12-foot hoses, with carrying case.
 - a. Scale: Gallons per minute.
 - b. Accuracy: Plus, or minus 2 percent between 20 and 80 percent of scale range.
- 6. Display: Shows rate of flow with register to indicate total volume in gallons.
- 7. Conversion Chart: Flow rate data compatible with sensor and indicator.
- 8. Operating Instructions: Include complete instructions with each flowmeter.

PART 3 - EXECUTION

3.1 INSTALLATION

- A. Install direct-mounted pressure gages in piping tees with pressure gage located on pipe at the most readable position.
- B. Install remote-mounted pressure gages on panel.
- C. Install valve and snubber in piping for each pressure gage for fluids (except steam).
- D. Install valve and syphon fitting in piping for each pressure gage for steam.
- E. Install test plugs in piping tees.
- F. Install flow indicators in piping systems in accessible positions for easy viewing.
- G. Assemble and install connections, tubing, and accessories between flow-measuring elements and flowmeters according to manufacturer's written instructions.
- H. Install flowmeter elements in accessible positions in piping systems.
- I. Install wafer-orifice flowmeter elements between pipe flanges.
- J. Install differential-pressure-type flowmeter elements, with at least minimum straight lengths of pipe, upstream and downstream from element according to manufacturer's written instructions.
- K. Install permanent indicators on walls or brackets in accessible and readable positions.
- L. Install connection fittings in accessible locations for attachment to portable indicators.
- M. Mount thermal-energy meters on wall if accessible; if not, provide brackets to support meters.
- N. Install pressure gages in the following locations:

1. Discharge of each pressure-reducing valve.
2. Inlet and outlet of each pressure reducing station.
3. Suction and discharge of each pump.

3.2 CONNECTIONS

- A. Install meters and gages adjacent to machines and equipment to allow service and maintenance of meters, gages, machines, and equipment.
- B. Connect flowmeter-system elements to meters.
- C. Connect flowmeter transmitters to meters.
- D. Connect thermal-energy meter transmitters to meters.

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 PRESSURE-GAGE SCHEDULE

- A. Pressure gages at suction and discharge of each pump shall be[one of] the following:
 1. Sealed-mounted, metal case.
 2. Test plug with chlorosulfonated polyethylene synthetic self-sealing rubber inserts.

3.5 PRESSURE-GAGE SCALE-RANGE SCHEDULE

- A. Scale Range for Steam Piping: 0 to 200 psi.

END OF SECTION 230519