SECTION 23.05.19
METERS AND GAGES FOR HVAC PIPING

PART 1 – GENERAL

1.01 SECTION INCLUDES
A. Flow meters.
B. Pressure gages and pressure gage taps.
C. Thermometers and thermometer wells.

1.02 REFERENCES
A. ASME B40.100 - Pressure Gauges and Gauge Attachments; The American Society of Mechanical Engineers.

1.03 SUBMITTALS
A. See Administrative Requirements, for submittal procedures.
B. Product Data: Provide list that indicates use, operating range, total range and location for manufactured components.
C. Samples: Submit two of each type of instrument specified.
D. Project Record Documents: Record actual locations of components and instrumentation.
E. Operation and Maintenance Data

1.04 ENVIRONMENTAL REQUIREMENTS
A. Do not install instrumentation when areas are under construction, except for required rough-in, taps, supports and test plugs.

PART 2 – PRODUCTS

2.01 LIQUID FLOW METERS
A. ASME MFC-3M Calibrated venturi orifice plate and flanges with valved taps, chart for conversion of differential pressure readings to flow rate, with pressure gage in case.
B. Annular element flow stations with meter set.
   1. Measuring Station: Type 316 stainless steel pitot type flow element installed in threaded nipple pipe section, with safety shut-off valves and quick coupling connections, and permanent metal tag indicating design flow rate, reading for design flow rate, metered fluid, line size, station or location number.
      a. Pressure rating: 275 psi (1896 kPa).
      b. Maximum temperature: 400 degrees F (204 degrees C).
      c. Accuracy: Plus 0.55 percent to minus 2.30 percent.
   2. Portable Meter Set: Dry single diaphragm type pressure gage with 6 inch (150 mm) dial pointer, stainless steel wetted metal parts, variable pulsation damper, equalizing valve, two bleed valves, and master chart for direct conversion of meter readings to flow rate, mounted in rust-proof carrying case with two ten foot (3 m) long rubber test hoses with brass valves or quick connections for measuring stations.
2.02 PRESSURE GAGES
A. Gage: ASME B40.100, drawn steel case, phosphor bronze bourdon tube, rotary brass movement, brass socket, with front recalibration adjustment, black scale on white background.
   1. Case: Steel with brass bourdon tube.
   2. Size: 2 inch (50 mm) diameter.
   3. Mid-Scale Accuracy: Two percent.
   4. Scale: Psi.

2.03 PRESSURE GAGE TAPPINGS
A. Gage Cock: Tee or lever handle, brass for maximum 150 psi (1034 kPa).
B. Pulsation Damper: Pressure snubber, brass with 1/4 inch (6 mm) connections.

2.04 STEM TYPE THERMOMETERS
A. Thermometer: ASTM E 1, red appearing mercury, lens front tube, cast aluminum case with enamel finish.
   1. Size: 7 inch (175 mm) scale.
   2. Window: Clear Lexan.
   3. Stem: 2 inch brass.
   4. Accuracy: 2 percent, per ASTM E 77.
   5. Calibration: Degrees F.

2.05 THERMOMETER SUPPORTS
A. Socket: Brass separable sockets for thermometer stems with or without extensions as required, and with cap and chain.

PART 3 – EXECUTION

3.01 INSTALLATION
A. Install in accordance with manufacturer’s instructions.
B. Provide one pressure gage per pump, installing taps before strainers and on suction and discharge of pump. Pipe to gage.
C. Install pressure gages with pulsation dampers. Provide gage cock to isolate each gage. Extend nipples to allow clearance from insulation.
D. Install thermometers in piping systems in sockets in short couplings. Enlarge pipes smaller than 2-1/2 inch (60 mm) for installation of thermometer sockets. Ensure sockets allow clearance from insulation.
E. Install thermometer sockets adjacent to controls systems thermostat, transmitter, or sensor sockets.
F. Coil and conceal excess capillary on remote element instruments.
G. Provide instruments with scale ranges selected according to service with largest appropriate scale.
H. Install gages and thermometers in locations where they are easily read from normal operating level. Install vertical to 45 degrees off vertical.
I. Adjust gages and thermometers to final angle, clean windows and lenses, and calibrate to zero.

END OF SECTION