SECTION 220519 – THERMOMETERS AND GAUGES FOR PLUMBING PIPING

Latest Edition 08-10-2024 See Underlined Text for Latest Edits.
(Engineer shall edit specifications and blue text in header to meet project requirements. This includes but is not limited to updating Equipment and/or Material Model Numbers indicated in the specifications and adding any additional specifications that may be required by the project. Also turn off all "Underlines".)

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this section and the other sections of Division 22.

1.2 SUMMARY

A. Section includes the requirements for thermometers, and gauges using the following:
< Edit for project>

1. Vapor actuated thermometers.
2. Liquid-in-glass thermometers.
3. Digital Thermostats.
4. Thermowells.
5. Dial-type pressure gauges.
6. Gauge attachments.
7. Test plugs.

1.3 ACTION SUBMITTALS

A. Product Data: For each product specified, include manufacturers cut sheets, dimensional data, performance data, installation instructions, wirings diagrams, power requirements, specified options, and warranty information.

1.4 INFORMATIONAL SUBMITTALS

A. Product Certificates: For each type of meter and gage, from manufacturer.

1.5 CLOSEOUT SUBMITTALS

A. Operation and Maintenance Data: Include a copy of the approved submittal for each product and material along with any applicable maintenance data in the project operation and maintenance manual.

1.6 WARRANTY/GUARENTEE

A. See Division 22, Specification Section "Basic Mechanical Requirements – Plumbing" for warranty and guarantee requirements.

PART 2 - PRODUCTS

2.1 GENERAL PRODUCT REQUIREMENTS

A. Equipment Design and Selection: Thermometers and gauges shall be designed and selected, for the intended use, in accordance with the requirements of this specification.

B. Acceptable Manufacturers: Subject to compliance with requirements, provide HVAC pumps by one (1) of the following:

1. Thermometers:
   a. Trerice, H.O. Company.
   b. Weiss Instruments, Inc.
   c. Weksler Instrument Corp.

2. Pressure Gauges:
   a. Trerice, H.O. Company.
   b. Weiss Instruments, Inc.
   c. Weksler Instrument Corp.

3. Test Plugs:
   a. Trerice, H.O. Company.
   b. Flow Design Inc.
   c. Peterson Equipment Company Inc.

2.2 THERMOMETERS

A. General Requirements: Provide Standard or Digital thermometers as manufactured by Trerice - Basis of Design or approved equal.

B. Standard Thermometers: Thermometers shall be either vapor actuated or liquid in glass type thermometers suitable for direct or remote mount installation as specified. Provide thermometers were indicated on the drawings and details.

1. Standard Thermostats – Service and Scale Range:

   a. Domestic Cold Water: 0ºF to 100ºF, with two (2) degree scale divisions.
   b. Domestic Hot Water: 30ºF to 180ºF, with two (2) degree scale divisions.

C. Direct-Mounted, Metal-Case, Vapor-Actuated Thermometers: Use direct mounted vapor actuated type thermometers as indicated below:

1. Standard: ASME B40.200.

2. Case: Sealed type, cast aluminum or drawn steel four and one half (4-1/2) inch nominal diameter.
3. Element: Bourdon tube or other type of pressure element.
4. Movement: Brass, precision geared.
5. Dial: Nonreflective aluminum with permanently etched scale markings graduated in ºF.
6. Pointer: Dark-colored metal.
7. Window: Glass
8. Ring: Metal.
9. Thermal System: Liquid-filled bulb in copper-plated steel, aluminum, or brass stem and of length to suit installation.

    a. Design for Thermowell Installation: Bare stem.

10. Accuracy: +/-1% of scale range.

D. Remote-Mounted, Metal-Case, Vapor-Actuated Thermometers: Use remote mounted vapor actuated type thermometers as indicated below:

1. Standard: ASME B40.200.
2. Case: Sealed type, cast aluminum or drawn steel four and one half (4-1/2) inch nominal diameter with back flange and holes for panel mounting.
3. Element: Bourdon tube or other type of pressure element.
4. Movement: Mechanical, with link to pressure element and connection to pointer.
5. Dial: Nonreflective aluminum with permanently etched scale markings graduated in ºF.
6. Pointer: Dark-colored metal.
7. Window: Glass.
8. Ring: Metal.
9. Thermal System: Liquid-filled bulb in copper-plated steel, aluminum, or brass stem and of length to suit installation.

    a. Design for Thermowell Installation: Bare stem.

10. Accuracy: +/-1% of scale range.

E. Liquid-in-Glass Metal-Case, Industrial-Style Thermometers: Use liquid-in-glass type thermometers as indicated below:

1. Standard: ASME B40.200.
2. Case: Cast aluminum; nine (9) inches nominal size unless otherwise indicated.
3. Case Form: Adjustable angle unless otherwise indicated.
4. Tube: Glass with magnifying lens and red or blue organic liquid.
5. Tube Background: Nonreflective aluminum with permanently etched scale markings graduated in ºF.
6. Window: Glass.

7. Stem: Copper-plated steel, aluminum, or brass for a separable and of length to suit installation.

   a. Design for Thermowell Installation: Bare stem.

8. Accuracy: +/-1% of scale range or one scale division, to a maximum of 1.5 percent of scale range.

F. Digital Thermometers – Hydronic Systems: Trerice Model SX9, seven (7) inch adjustable angle, Solar Threm light powered digital thermometer with large 9/16-inch LCD °F/°C display, cast aluminum case NEMA – 4X/IP 65, Range minus 40°F to 300°F. Stem style and length to suit project requirements.

2.3 THERMOWELLS

A. Thermowells:

1. Standard: ASME B40.200.
2. Description: Brass or stainless-steel thermometer well.
3. Pressure Rating: Not less than piping system design pressure.
4. Stem length: To extend two (2) inches into fluid or center of pipe, whichever, is shorter.
5. Extension for Insulated Piping: Two (2) inches nominal, but not less than thickness of insulation.
6. Threaded Cap Nut: With chain permanently fastened to well and cap.

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

2.4 PRESSURE GAUGES

A. General Requirements:

1. Provide pressure gauges were indicated on the drawings and as specified.
2. Service and Scale Range in pounds per square inch (PSI):

   a. Domestic Cold Water: Zero (0) to two (2) times operating pressure.
   b. Domestic Hot Water: Zero (0) to two (2) times operating pressure.

<Engineer to provide a schedule of operating pressures on the plumbing drawings >

B. Direct-Mounted, Metal-Case, Dial-Type Pressure Gages:

1. Standard: ASME B40.100.
2. Case: Liquid-filled type; cast aluminum or drawn steel; four and one half (4-1/2) inch nominal diameter.
3. Pressure-Element Assembly: Bourdon tube unless otherwise indicated.

4. Match pressure connection size in first subparagraph below with gage attachment size.
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, Acrylic or Lexan.
10. Ring: Metal.
11. Accuracy: Grade A, plus or minus one (1) percent of scale range.

C. Gage Attachments: Provide gage attachments as indicated below:

1. Syphons: one quarter (1/4) inch straight coil of brass tubing with threads on each end.
2. Gage Valves: Provide gage valves (specialty valves) as specified in Division 22 Specification Section "Valves for Plumbing Piping Systems".

2.5 TEST PLUGS

A. Description: Nickel plated brass body test plug in one half (1/2) inch fitting.

B. Body: Length as required to extend beyond insulation.

C. Pressure Rating: 500 psig minimum.

D. Core Inserts: Two (2) self-sealing valve types, suitable for inserting a one eighth (1/8) inch (3mm) outside-diameter probe from a dial thermometer or pressure gage.

E. Core Material: According to the following for fluid and temperature range:

1. Air, Water, Glycol Oil, and Gas: 20ºF to 200ºF, neoprene rubber.
2. Air and Water: -30°F to 275°F (-35°C to 136°C), ethylene-propylene-diene-terpolymer (EDPM) rubber.

F. Test Plug Cap: Gasketed and threaded cap, with retention chain.

G. Test Kit: Provide test kit consisting of one (1) pressure gage and gage adapter with probe, two (2) bimetal dial thermometers and a carrying case

H. Pressure Gage and Thermometer Ranges: Approximately two (2) times systems operating conditions.

I. Body: Length as required to extend beyond insulation.

PART 3 - EXECUTION

3.1 INSTALLATION

A. Locations and Arrangements: Drawings (plans, schematics, and diagrams) indicate the general location and arrangement of thermometers and gages in the piping systems. So far as practical, install thermometers and gages as indicated.

3.2 THERMOMETERS

A. Install direct-mounted thermometers in thermowells at the most readable position and adjust vertical and tilted positions.

B. Install remote-mounted thermometer bulbs in thermowells and install cases on panels; connect cases with tubing and support tubing to prevent kinks. Use minimum tubing length.

C. Install thermometers in the following locations:

1. Inlet and outlet of each domestic water heater.
2. Inlets and outlets of each domestic water heat exchanger.
3. Inlet and outlet of each domestic hot water storage tank.
4. <Insert additional locations as required by the project>.

D. For thermometer valves see Division 22 Specification Section “Valves for Plumbing Piping Systems”.

3.3 THREMOWELLS

A. Install thermowells with socket extending a minimum of two (2) inches into fluid or center of pipe, whichever is shorter.

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.

3.4 PRESSURE GAGES

A. Install pressure gauges in the following locations:

1. Building water service entrance into building.
2. Inlet and outlet of each pressure-reducing valve.
3. Inlet and outlet at each heating equipment used to heat domestic hot water.
4. Suction and discharge of each domestic hot water circulating pump.
5. Suction and discharge of the domestic water booster pump system.

6. < Insert additional locations as required by the project >.

B. Install direct-mounted pressure gauges in piping tees with pressure gauge located on pipe at the most readable position.

C. Install remote-mounted pressure gauges on panel.

D. For gauge valves see Division 22 Specification Section “Valves for Plumbing Piping Systems”.

E. Install test plugs in piping tees.

3.5 CONNECTIONS

A. Install thermometers and gauges adjacent to machines and equipment to allow service and maintenance of thermometers, gauges, machines, and equipment.

3.6 ADJUSTING

A. Adjust faces of thermometers and gauges to proper angle for best visibility.

B. Calibrate meters according to manufacturer's written instructions, after installation.

C. Adjusting: Adjust faces of meters and gages to proper angle for best visibility.

D. Cleaning: Clean windows of meters and gages and factory finished surfaces. Replace cracked and broken windows and repair scratched and marred surfaces with manufacturer's touchup paint.

END OF SECTION 220519