

## SECTION 22 10 00 - PLUMBING PIPING

### PART I - GENERAL

#### 1.1 COMPLIANCE

- A. All potable water system components shall be in compliance with *Reduction in Lead in Drinking Water Act*
- B. Potable water system components shall be in compliance with applicable NSF/ANSI Standards.

### PART 2 - PRODUCTS

#### 2.1 VALVES

##### A. Shut-Off Valves for Plumbing Systems

- 1. Size 2" and Smaller, Threaded or Solder-End Two-Piece Full-Port Ball Valve
  - a. 600 WOG.
  - b. Shut-off class VI, bi-directional.
  - c. Two-piece cast bronze body.
  - d. NPT or solder connections.
  - e. 316 stainless steel solid tunneled ball (hollow ball not acceptable).
  - f. 316 stainless steel stem and nut.
  - g. PTFE seats.
  - h. Adjustable stem packing.
  - i. Lever handle.
  - j. Insulated piping applications: Provide stem extension. Formed metal extension not acceptable.
  - k. Approved manufacturers: Apollo, Nibco, Watts, Viega.
- 2. Size 2 1/2" and 3", Threaded or Solder-End Two-Piece Ball Valve.
  - a. 600 WOG.
  - b. Shut-off class VI, bi-directional.
  - c. Two-piece cast bronze body.
  - d. NPT or solder connections.
  - e. 316 stainless steel solid tunneled ball (hollow ball not acceptable).
  - f. 316 stainless steel stem and nut.
  - g. PTFE seats.
  - h. Adjustable stem packing.
  - i. Lever handle.
  - j. Insulated piping applications: Provide stem extension. Formed metal extension not acceptable.
  - k. Approved manufacturers: Apollo, Nibco, Watts, Viega.
- 3. Size 2 1/2" and Larger

- a. 200 WOG.
  - b. Shut-off class VI, bi-directional.
  - c. Two-piece cast iron or ductile iron body.
  - d. Heat-fused epoxy coating on all interior and exterior surfaces.
  - e. Flanged connections.
  - f. Stainless steel full-port tunneled ball (TFE coated ball not acceptable).
  - g. PTFE seats (Nitrile or EPDM not acceptable).
  - h. Stainless steel stem.
  - i. Adjustable stem packing.
  - j. Lever handle.
  - k. Approved manufacturers: Apollo, Nibco, Watts.
4. Size 2 1/2" through 20", Resilient-Seated Butterfly Valve.
- a. Bi-directional bubble-tight shut-off rating for in-line service as well as dead-end service (with either mating flange removed): 200 PSIG for valves 12" and smaller, 150 PSIG for valves 14" and larger.
  - b. Ductile iron lug style body (cast iron or wafer style body not acceptable).
  - c. Heat-fused epoxy coating.
  - d. EPDM molded-in seat or cartridge-style seat with rigid backing ring (boot-type seat not acceptable).
  - e. Aluminum bronze or stainless steel disc.
  - f. 416 stainless steel shaft.
  - g. Manual actuator:
    - 1) Valves 6" and smaller: 10-position lever handle.
    - 2) Valves 8" and larger: Geared rotary hand-wheel operator.
  - h. Approved Manufacturers: Apollo, Nibco, Watts.

## 2.2 MAGNETIC FLOW METERS FOR PLUMBING SYSTEMS

### A. General

- 1. Provide flow meters as scheduled or otherwise indicated in documents.
- 2. Flow meters shall be of electromagnetic type.
- 3. Flow meters shall be manufactured in conformance with ISO standards.

### B. Flow Meter Sensor

- 1. Flow meter shall incorporate ANSI class 150 flanged connections, full line-size 304 stainless steel flow tube, 316 stainless steel electrodes and inner liner compatible with temperature and chemical content of flow media.
- 2. Flow meter shall be rated for 150 PSIG system pressure and shall have adequate structural integrity for flow rate equal to 150% of scheduled maximum initial or future flow rate, whichever is greater.
- 3. Flow meter shall be provided with adequate means for grounding process fluid (e.g. grounding rings or grounding electrode).
- 4. Flow meter shall be rated for flow media temperature and 140 degrees F ambient air temperature.

5. Flow meter sensor shall incorporate firmware for storage of pertinent parameters unique to meter.

#### C. Liner

1. Liner material shall be PTFE.

#### D. Transmitter

1. Flow meter shall incorporate remote mounted programmable transmitter that incorporates a digital display.
2. Transmitter shall be rated for 140 degrees ambient air temperature.
3. Transmitter cable 25 ft. minimum length shall be provided with each unit unless otherwise scheduled or noted within project documents. Cable length shall be adequate to satisfy specific installation requirements.
4. Electrical power input shall be 24VAC or 24VDC unless indicated to be 120VAC within documents.
5. Transmitter shall calculate and display flow rate and net totalized flow along with associated engineering units (i.e. GPM and Gal.) on a three line digital display. A password or external key shall be required to alter display.
6. Transmitter shall provide two pulsed outputs, no exceptions. One pulsed output shall indicate incremental flow in one direction while other indicates incremental flow in opposite direction such that net totalized flow can be calculated remotely.
7. Transmitter shall produce 4-20 mA output signal directly proportional to volumetric flow rate. A digital output shall indicate direction of flow.
8. Unless scheduled or otherwise indicated, initial span adjustment of each transmitter shall be 0-120% of scheduled maximum flow rate.
9. Transmitter shall incorporate self-diagnostics and test functions. Transmitter shall be capable of accomplishing following without use of external equipment:
  - a. Testing of all outputs and displays.
  - b. Verification of accuracy.
  - c. Verification of current loop integrity.
10. Upon power up, transmitter shall be capable of automatically uploading parameters resident within sensor firmware such that no operator configuration is required.
11. Transmitter shall incorporate a front facing optical port for communication of verified accuracy.
12. Transmitter shall be capable of downloading all test function results into a laptop computer.

#### E. Accuracy

1. Accuracy of each meter/transmitter assembly shall be  $\pm 0.25\%$  of flow rate reading over a range of 3-15 ft/sec fluid velocity, with a repeatability of 0.1%. Accuracy at 1 ft/sec shall be  $\pm 0.50\%$ .

#### F. Calibration

1. Each meter shall be calibrated on a NIST traceable flow stand at a minimum of three operating points. These three points shall be flow rates associated with fluid velocities of 1.0 FPS, 8.0 FPS and 15.0 FPS. Written documentation of calibration shall be provided.
2. Each meter shall have factory fingerprinting to allow NIST traceable in-situ calibration verification to  $\pm 1\%$  of original factory calibration.

#### G. Warranty

1. One year written manufacturer warranty shall be provided.

#### H. Basis of Design

1. ABB Watermaster
2. ABB Processmaster

## PART 3 - EXECUTION

### 3.1 VALVES

#### A. Valve Orientation.

##### 1. Ball Valve.

- a. Valve may be installed in any position except with stem oriented vertically downward (i.e. with handle at bottom).
- b. Valve shall be installed such that direction of flow indication on valve body and/or product literature, if any, matches the actual direction of fluid flow through valve.

##### 2. Butterfly Valve.

- a. Valve shall be installed such that shaft is oriented horizontally. In no case shall valve be installed such that the shaft is oriented vertically downward (i.e. with the actuator at the bottom).
- b. Valve shall be installed such that the direction of flow indication on valve body and/or product literature, if any, matches the actual direction of fluid flow through valve.

#### B. Valve Insulation.

##### 1. Insulated piping applications.

- a. Valves in insulated piping systems shall have body, flanges, etc., completely insulated. The practice of leaving hot water valves and associated unions/flanges un-insulated is not acceptable.
- b. Insulated valves shall be equipped with extended stems and protective shields as required to allow operation without disturbing insulation.
- c. Valves shall be provided with lock-out trim where indicated on drawings. Extended stems are not required on valves with lock out trim.

### 3.2 FLOW METERS

- A. Remote mounted transmitter for magnetic flow meters shall be installed at BAS Control Panel or on wall or structure near flow tube in clean dry location. Transmitter shall be easily visible with display easily readable.
- B. Provide a full size un-metered maintenance bypass with shut-off valve at the flow meter. Also, provide a shut-off valve at the meter inlet and one (1) at the outlet.
- C. Each meter assembly shall include detailed installation and operation instructions that include piping straight run requirements.
- D. Each bid shall include cost of on-site start-up, commissioning and training.

## END OF SECTION 22 10 00

This section of the *U of I Facilities Standards* establishes minimum requirements only. It should not be used as a complete specification.