# GENERAL

## SECTION INCLUDES

### Water meters.

### Calibrated balance valves.

### Pressure gages and pressure gage taps.

### Thermometers and thermometer wells.

### Piping pressure and temperature test plugs.

## RELATED SECTIONS

### Section 23 09 00 Digital Control Equipment

### Section 23 09 01 Instruments and Control Elements

## REFERENCES

### See Section 22 05 00.

## SUBMITTALS

### See Section 22 05 00.

## PROJECT RECORD DOCUMENTS

### Accurately record actual locations of instrumentation.

## ENVIRONMENTAL REQUIREMENTS

### Do not install instrumentation when areas are under construction, except for required rough‑in, taps, supports and test plugs.

# PRODUCTS

## DOMESTIC WATER METER AND IRRIGATION DEDUCT WATER METER

### Construction shall comply with ANSI and AWWA C701 standards as required for domestic water metering applications.

### The measuring element shall consist of the transmission coupling, measuring element insert, rotor, inlet and outlet straightening vanes with nose cones, and calibration ring assembly. The register and measuring element shall be designed and constructed so that they may be removed without removing the meter housing from the installation. Meters shall be designed for maximum operating temperature of 120 degrees F and a maximum operating pressure of 150 PSI.

### Meter housing shall be cast bronze construction. Nose cone, straightening vanes and rotor shall be thermoplastic construction. Rotor thrust bearings shall be sapphire jewels and rotor bearing pivots shall be 316 stainless steel. Register lid and shroud shall be thermoplastic and bronze and trim shall be stainless steel.

### Transmission coupling between measuring element and meter register shall be ceramic magnetic direct drive.

### Register shall be a straight-reading odometer-type totalization display, 360 degree test circle with center sweep hand and flow finder to detect leaks. Register gearing shall consist of self-lubricating thermoplastic gears all permanently sealed. Registration for meters less than 6" shall be calibrated for 100,000,000 gallons @ 100 gallons/sweep hand revolution. Registration for meters 6" and larger shall be calibrated for 1,000,000,000 gallons @ 1,000 gallons/sweep hand revolution. Register shall be installed using either tamper detection seal wire screws or TORX tamper resistant seal screws. A tamper resistant calibration plug seal shall also be provided to protect from unauthorized personnel.

### Meters shall be provided with an integral 316 stainless steel strainer manufactured and installed into its inlet end complete with a removable cover plate which will permit easy access to the strainer for routine cleaning.

### Provide remote readout device if meter is installed greater than 5’-0” above finished floor. Mount remote readout device on wall at 5’-0” above finished floor.

### Insulation: Removable closed cell insulation, preformed to match meter housing.

### See Plumbing Equipment Schedules for specific performance requirements.

## CALIBRATED BALANCE VALVES

### Pre-Set Balance Feature. Valves to be designed to allow Installing Contractor to pre-set balance points for proportional system balance prior to system start-up in accordance with scheduled flow rates.

### Valve Design and Construction. All valves 1/2" to 3" pipe size to be of bronze body/brass ball construction with glass and carbon filled TFE seat rings. Valves to have differential pressure read-out ports across valve seat area. Read-out ports to be fitted with internal EPT insert and check valve. Valve bodies to have 1/4" NPT tapped rain/purge port. Valves to have memory stop feature to allow valve to be closed for service and then reopened to set point without disturbing balance position. All valves to have calibrated name plate to assure specific valve settings. Valves to be leak-tight at full rated working pressure.

### Valves 4" pipe size to be of cast iron body/brass vane construction with differential pressure read-out ports fitted with internal EPT insert and check valve.

### Preformed Insulation. All vales to be provided with molded insulation to permit access for balance and read-out.

### Design Pressure/Temperature.

#### 1/2" - 3" NPT connections 300 psig to 250 deg. F.

#### 1/2" and 3/4" Sweat connections 200 psig at 250 deg. F.

#### 4" flanged connections 125 psig at 250 deg. F.

### Calibrated balance valves to be ITT Bell and Gossett Model CB or equivalent.

## PRESSURE GAUGES

### Type: General use, ASME B40.1, Grade A, phosphor bronze bourdon-tube type, bottom connection, liquid-filled.

### Case: Drawn steel or brass, glass lens, 4-1/2-inches diameter.

### Connector: Brass, 1/4-inch NPS.

### Scale: White coated aluminum, with permanently etched markings.

### Accuracy: Plus or minus 1 percent of range span.

### Range: Conform to the following:

#### Vacuum: 30 inches Hg to 15 psi.

#### All fluids: 2 times operating pressure.

## PRESSURE GAUGE ACCESSORIES

### Syphon: 1/4-inch NPS straight coil constructed of brass tubing with threads on each end.

### Snubber: 1/4-inch NPS brass bushing with corrosion-resistant porous metal disc. Disc material shall be suitable for fluid served and rated pressure. Provide extension for use on insulated systems.

## THERMOMETERS, GENERAL

### Accuracy: Plus or minus 1 percent of range span or plus or minus one scale division to maximum of 1.5 percent of range span.

### Scale range: Temperature ranges for services listed as follows:

#### Domestic and Laboratory Hot Water: 30 to 240 deg with 2-degree scale divisions (0 to 115 deg C with 1-degree scale divisions).

#### Domestic Cold, Laboratory Cold, and Tepid Water: 0 to 100 deg F with 2-degree scale divisions (minus 18 to 38 deg C with 1-degree scale divisions).

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#### Domestic Cold Water: 0 to 100 deg F with 2-degree scale divisions (minus 18 to 38 deg C with 1-degree scale divisions).

#### Hot Water: 30 to 300 deg with 2-degree scale divisions (0 to 150 deg C with 1-degree scale divisions).

#### Condenser Water: 0 to 160 deg F with 2-degree scale divisions (minus 18 to 70 deg C with 1-degree scale divisions).

#### Chilled Water: 0 to 100 deg F with 2-degree scale divisions (minus 18 to 38 deg C with 1-degree scale divisions).

#### Steam and Condensate: 50 to 400 deg F with 2-degree scale divisions (10 to 205 deg C with 1-degree scale divisions).

## MERCURY-IN-GLASS THERMOMETERS

### Case: Die cast, aluminum finished, in baked epoxy enamel, glass front, spring secured, 9 inches long.

### Adjustable Joint: Finished to match case, 180-degree adjustment in vertical plane, 360-degree adjustment in horizontal plane, with locking device.

### Tube: Red reading, mercury filled, magnifying lens.

### Scale: Satin-faced, nonreflective aluminum, with permanently etched markings.

### Stem: Copper-plated steel, aluminum or brass, for separable socket, length to suit installation.

## GLASS THERMOMETERS

### Standard: ASME B400.200.

### Case: Die cast, aluminum finished, in baked epoxy enamel, glass front, spring secured, 9 inches long.

### Adjustable Joint: Finished to match case, 180-degree adjustment in vertical plane, 360-degree adjustment in horizontal plane, with locking device.

### Tube: Red reading, magnifying lens, with non-mercury fluid.

### Scale: Satin-faced, nonreflective aluminum, with permanently etched markings.

### Stem: Copper-plated steel, aluminum or brass, for separable socket, length to suit installation.

## THERMOMETER WELLS

### Thermometer Wells: Brass or stainless steel, pressure rated to match piping system design pressure; with 2-inch extension for insulated piping and threaded cap nut with chain permanently fastened to well and cap.

## PIPING PRESSURE AND TEMPERATURE TEST PLUGS

### Test Plugs shall be nickel-plated brass body, with 1/2-inch NPS fitting and 2 self-sealing valve-type core inserts, suitable for inserting a 1/8-inch O.D. probe assembly from a dial-type thermometer or pressure gage. Test plug shall have gasketed and threaded cap with retention chain and body of length to extend beyond insulation. Pressure rating shall be 500 psig.

### Core Material: Conform to the following for fluid and temperature range:

#### Air, Water, Oil, and Gas, 20 to 200 deg F (minus 7 to 93 deg C): Neoprene.

# EXECUTION

## GENERAL

### Install in accordance with manufacturer's instructions.

## THERMOMETERS

### Install thermometers in vertical and tilted positions to allow reading by observer standing on floor.

### Install as shown on plans and elsewhere as indicated.

### Thermometer Wells: Install in piping tee where thermometers are indicated, in vertical position. Fill well with oil or graphite and secure cap. Provide extension on insulated systems. Install in socket extending to center of pipe.

## PRESSURE GAUGES

### Install pressure gauges in piping tee with pressure gauge valve, located on pipe at most readable position.

### Install as shown on plans, and elsewhere as indicated.

### Pressure Gauge Ball Valves: Install in piping tee with snubber. Install syphon in lieu of snubber for steam pressure gages.

### Pressure Gauge Accessories:

#### Install ball valve between system and pressure gauge.

#### Install in piping tee with snubber.

### If applicable, cut rubber nipple on top of pressure gauge per manufacturer recommendations.

## TEST PLUGS

### Test Plugs: Install where indicated, located on pipe at most readable position. Secure cap.

## FLOW MEASURING METERS

### Install where shown on plans and elsewhere as indicated. Provide manufacturer-recommended upstream and downstream straight distances.

### General: Install flow meters for piping systems located in accessible locations at most readable position. Maintain manufacturer-recommended minimum upstream and downstream distances.

### Window Flow Meters: Install in vertical upward position with impact tube mounted in bushing centered on pipe with 10 pipe diameters upstream and 5 pipe diameters downstream of straight unrestricted piping for 1-1/4 inches and smaller, 20 pipe diameters upstream and 10 pipe diameters downstream for 1-1/2 inches and larger. Calibrate meter after installation in accordance with manufacturer's installation instructions.

### Calibrate meter after installation in accordance with manufacturer's installation instructions.

### Connect meter to EMCS. Coordinate with controls contractor and provide all necessary interconnections for accurate transmission of data.

## ADJUSTING AND CLEANING

### Adjusting: Adjust faces of meters and gauges to proper angle for best visibility.

### Cleaning: Clean windows of meters and gauges and factory-finished surfaces. Replace cracked and broken windows, and repair scratched and marred surfaces with manufacturer's touch-up paint.

END OF SECTION 22 05 19