SECTION 331900 - WATER UTILITY METERING EQUIPMENT

This Section specifies meters and appurtenances commonly used in water distribution systems.

1. GENERAL
   * + 1. SUMMARY
          1. Section Includes:

Positive displacement meters.

Magnetic flow meters.

Ultrasonic flow meters.

Venturi flow meters.

Transmitters.

Indicators.

Recorders.

Integrators.

* + - * 1. Related Requirements:

List other Sections directly related to or affecting Work of this Section. Include Sections specifying information expected to be found in this Section, as well as Sections required to describe complete system or assembly requirements.

Section 221100 - Facility Water Distribution: Requirements for domestic water piping at building.

Section 330563 - Concrete Vaults and Chambers: Requirements for meter boxes used to access and protect meter installation.

Section 330577 - Fiberglass Metering Manholes: Requirements for meter boxes used to access and protect meter installation.

Section 331413 - Public Water Utility Distribution Piping: Requirements for domestic water piping from supply to utility source connection at Site.

Section 331416 - Site Water Utility Distribution Piping: Requirements for domestic water piping from building to utility source.

* + - 1. DEFINITIONS

Limit list of definitions to terms unique to this Section and not provided elsewhere.

* + - * 1. FRP: Fiberglass-reinforced plastic.
      1. REFERENCE STANDARDS

List reference standards included within text of this Section, with designations, numbers, and complete document titles.

* + - * 1. American Society of Mechanical Engineers:

ASME B16.1 - Gray Iron Pipe Flanges and Flanged Fittings: Classes 25, 125, and 250.

ASME PTC 19.5 - Flow Measurement.

* + - * 1. American Water Works Association:

AWWA C700 - Cold-Water Meters - Displacement Type, Metal Alloy Main Case.

AWWA C701 - Cold-Water Meters - Turbine Type, for Customer Service.

AWWA C702 - Cold-Water Meters - Compound Type.

AWWA C704 - Propeller-Type Meters for Waterworks Applications.

AWWA C707 - Encoder-Type Remote-Registration Systems for Cold-Water Meters.

AWWA M6 - Water Meters - Selection, Installation, Testing, and Maintenance.

* + - * 1. ASTM International:

ASTM A126 - Standard Specification for Gray Iron Castings for Valves, Flanges, and Pipe Fittings.

ASTM B61 - Standard Specification for Steam or Valve Bronze Castings.

* + - * 1. National Electrical Manufacturers Association:

NEMA 250 - Enclosures for Electrical Equipment (1000 Volts Maximum).

* + - * 1. NSF International:

NSF 61 - Drinking Water System Components - Health Effects.

NSF 372 - Drinking Water System Components - Lead Content.

* + - 1. PREINSTALLATION MEETINGS
         1. Convene minimum [**one week**] [**<\_\_\_\_\_\_\_\_> weeks**] prior to commencing Work of this Section.
      2. SUBMITTALS

Only request submittals needed to verify compliance with Project requirements.

* + - * 1. Submittals for this section are subject to the re-evaluation fee identified in Article 4 of the General Conditions.
        2. Manufacturer’s installation instructions shall be provided along with product data.
        3. Submittals shall be provided in the order in which they are specified and tabbed (for combined submittals).
        4. Product Data: Submit manufacturer information for water meters and accessories.
        5. Manufacturer's Certificate: Certify that water meters meet or exceed specified requirements.

Include separate paragraphs for additional certifications.

* + - * 1. Manufacturer Instructions: Submit detailed instructions on installation requirements, including storage and handling procedures.
        2. Source Quality-Control Submittals: Indicate results of [**shop**] [**factory**] tests and inspections.
        3. Field Quality-Control Submittals: Indicate results of Contractor-furnished tests and inspections.
        4. Manufacturer Reports:

Certify that equipment has been installed according to manufacturer's instructions.

Indicate activities on Site, adverse findings, and recommendations.

* + - * 1. Qualifications Statements:

Coordinate following subparagraphs with requirements specified in QUALIFICATIONS Article.

Submit qualifications for manufacturer and installer.

Submit manufacturer's approval of installer.

* + - 1. CLOSEOUT SUBMITTALS
         1. Section 017716 - Contract Closeout: Requirements for submittals.
         2. Project Record Documents: Record actual locations of water meters.
      2. QUALITY ASSURANCE

Use this Article to specify compliance with overall reference standards affecting products and installation included in this Section.

* + - * 1. Materials in Contact with Potable Water: Certified to NSF 61 and NSF 372.
        2. Perform Work according to [**NYSDOH**] [**AWWA**] <**\_\_\_\_\_\_\_\_**> standards.

Include following paragraph only when cost of acquiring specified standards is justified.

* + - * 1. Maintain [**one copy**] [**<\_\_\_\_\_\_\_\_> copies**] of [**each**] document on Site.
      1. QUALIFICATIONS

Coordinate following paragraphs with requirements specified in SUBMITTALS Article.

* + - * 1. Manufacturer: Company specializing in manufacturing products specified in this Section with minimum [**three**] <**\_\_\_\_\_\_\_\_**> years' [**documented**] experience.
        2. Installer: Company specializing in performing Work of this Section with minimum [**three**] <**\_\_\_\_\_\_\_\_**> years' [**documented**] experience [**and approved by manufacturer**].
      1. DELIVERY, STORAGE, AND HANDLING
         1. Section 016500 - Materials and Equipment: Requirements for transporting, handling, storing, and protecting products.
         2. Inspection: Accept materials on Site in manufacturer's original packaging and inspect for damage.
         3. Store materials according to manufacturer instructions.
         4. Protection:

Protect materials from moisture and dust by storing in clean, dry location remote from construction operations areas.

Provide additional protection according to manufacturer instructions.

* + - 1. EXISTING CONDITIONS
         1. Field Measurements:

Verify field measurements prior to fabrication.

Indicate field measurements on Shop Drawings.

* + - 1. WARRANTY

This Article extends warranty period beyond one year. Extended warranties may increase construction costs and State enforcement responsibilities. Specify warranties with caution.

* + - * 1. Furnish [**five**] <**\_\_\_\_\_\_\_\_**>-year manufacturer's warranty for water meters.

1. PRODUCTS
   * + 1. POSITIVE DISPLACEMENT METERS
          1. [Manufacturers](http://www.specagent.com/LookUp/?ulid=11929&mf=04&src=wd):

Badger Meter, (800) 616-3837, 4545 West Brown Deer Rd., Milwaukee, WI 53223.

Neptune Technology Group, (334) 283-6555, 1600 Alabama Highway 229, Tallassee, AL 36078.

Sensus, (914) 323-5700, 1 International Drive, Rye Brook, NY 10573.

Approved equivalent.

Insert descriptive specifications below to identify Project requirements and to eliminate conflicts with products specified above.

* + - * 1. Description:

Brass body turbine meter with magnetic drive register.

Comply with AWWA [**C700**] [**C701**] [**C702**].

Type: Positive displacement disc.

Case Material: Bronze.

Bottom Cap:

Material: Cast iron.

[**Type: Frost proof; breakaway**].

Register: Hermetically sealed.

Remote Reading: Comply with AWWA C707.

* + - * 1. Performance and Design Criteria:

Service: [**Cold water, 122 degrees F**] [**Hot water, 200 degrees F**].

Nominal Flow Rate: <\_\_\_\_\_\_\_\_> gpm.

Pressure Drop at Nominal Flow: <\_\_\_\_\_\_\_\_> psig.

Maximum Flow Rate: <\_\_\_\_\_\_\_\_> gpm.

Maximum Operating Pressure: <\_\_\_\_\_\_\_\_> psig.

Accuracy: [**1.5**] <**\_\_\_\_\_\_\_\_**> percent.

Maximum Counter Reading: [10] [100] MG.

Pipe Size: [1/2] [3/4] <\_\_\_\_\_\_\_\_> inch.

* + - 1. MAGNETIC FLOW METERS
         1. [Manufacturers](http://www.specagent.com/LookUp/?ulid=11931&mf=04&src=wd):

Badger Meter, (800) 616-3837, 4545 West Brown Deer Rd., Milwaukee, WI 53223.

Northeast Controls, (518) 664-6600, 3 Enterprise Avenue, Clifton Park, NY 12065.

Approved equivalent.

Insert descriptive specifications below to identify Project requirements and to eliminate conflicts with products specified above.

* + - * 1. Description:

Low-frequency, electromagnetic induction-type flowmeter, producing a linear signal directly proportional to flow rate, consisting of flow tube, signal cable, and transmitter.

Flow Rate Range: <\_\_\_\_\_\_\_\_> to <\_\_\_\_\_\_\_\_> gpm.

Accuracy: Plus or minus 1 percent of actual flow rate over a 10:1 range.

Provide adjustment for zero and span.

Size: As indicated [**on Drawings**] [**in schedule following END OF SECTION**].

* + - * 1. Flow Tube:

Materials: [**Type <\_\_\_\_\_\_\_\_> stainless steel**] <**\_\_\_\_\_\_\_\_**>, with [**polyurethane**] <**\_\_\_\_\_\_\_\_**> liner.

Length: As indicated [**on Drawings**] [**in schedule following END OF SECTION**].

End Connections: [**Flanged; ASME B16.1; carbon steel**] [**Sleeve-type couplings**] [**Mechanical-type couplings**] [**Integral fiberglass flanges**].

* + - * 1. Electrodes:

Material: Type 316L stainless steel.

Self-cleaning.

* + - * 1. Accessories:

[**Automatic, non-mechanical electrode cleaning system without taking meter out of service.**]

Cable: Between transmitter and receiver.

* + - 1. ULTRASONIC FLOW METERS
         1. [Manufacturers](http://www.specagent.com/LookUp/?ulid=11932&mf=04&src=wd):

Badger Meter, (800) 616-3837, 4545 West Brown Deer Rd., Milwaukee, WI 53223.

Omega Engineering, Inc., (203) 359-1660, 800 Connecticut Ave. Suite 5N01, Norwalk, CT 06854

Approved equivalent.

Insert descriptive specifications below to identify Project requirements and to eliminate conflicts with products specified above.

* + - * 1. Description:

Clamp separate and nonintrusive transmitting and receiving transducers to outside of process pipe.

Flow Rate Range: <\_\_\_\_\_\_\_\_> to <\_\_\_\_\_\_\_\_> gpm.

Ambient Operating Temperature Range:

Indoors: <\_\_\_\_\_\_\_\_> degrees F.

Outdoors: <\_\_\_\_\_\_\_\_> degrees F

* + - * 1. Output Signal:

4 to 20 mA dc.

Linear with flow rate.

Linearity: Plus or minus 0.5 percent.

Repeatability: 0.1 percent under simulated flow.

Long-Term Drift: Less than 0.1 percent.

* + - 1. VENTURI FLOW METERS
         1. [Manufacturers](http://www.specagent.com/LookUp/?ulid=11933&mf=04&src=wd):

Northeast Controls, (518) 664-6600, 3 Enterprise Avenue, Clifton Park, NY 12065.

Rosemount Emerson, 8000 West Florissant Avenue, P.O. Box 4100, St. Louis , MO 63136.

Approved equivalent.

Insert descriptive specifications below to identify Project requirements and to eliminate conflicts with products specified above.

* + - * 1. Description:

Designed for potable water service with at least 90 percent head recovery.

Type: Differential.

Comply with ASME PTC 19.5.

Size: As indicated [**on Drawings**] [**in schedule following END OF SECTION**].

Flow Rate Range: <\_\_\_\_\_\_\_\_> to <\_\_\_\_\_\_\_\_> gpm.

End Connections:

Flanged.

Comply with ASME B16.1.

* + - * 1. Materials:

Body: [**Cast iron; ASTM A126; Grade B**] <**\_\_\_\_\_\_\_\_**>.

Throat Section and Vent Bushing: [**Bronze; ASTM B61**] <**\_\_\_\_\_\_\_\_**>.

Interior Water Passages: Lined with anti-stick material.

* + - * 1. Holding Flange:

Material: [**Carbon steel**] [**Bronze**] [**FRP**] <**\_\_\_\_\_\_\_\_**>.

Provide integral pressure taps.

Consider using following paragraph if venturi flow meter is to be used for sludge service.

* + - * 1. Cleaning Provisions:

Provide manual vent cleaners on tube.

Provide water purge system and matched assemblies of piping, valves, rotameters, and fittings.

* + - 1. TRANSMITTERS:
         1. Description:

Output:

4 to 20 mA dc analog signal.

Accuracy: Plus or minus <**\_\_\_\_\_\_\_\_**> percent of full scale.

Transmitter Communication Interface: [**PROFIBUS**] <**\_\_\_\_\_\_\_\_**>.

Communication Firmware and Software: <**\_\_\_\_\_\_\_\_**>.

Housing Material: Cast aluminum.

* + - * 1. Human-Machine Interface:

Touch-screen programming, functioning through enclosure window without opening enclosure.

Display:

Size: Four lines by 16 characters.

Type: Backlit LCD.

User-selectable engineering units.

Readout of diagnostic error messages.

* + - * 1. Mounting:

Integral or remote mounting up to <\_\_\_\_\_\_\_\_> feet from meter.

Mounting Locations Less Than 4 Feet Above Grade: Furnish stainless-steel mounting posts.

* + - * 1. Accessories:

Current signal output simulation.

Empty pipe detection.

Self-diagnostics.

Automatic zero adjustment.

Stainless-steel sunshield.

Signal Cable: Furnished by flow meter manufacturer.

* + - 1. INDICATORS

If indicators not included as part of flow meter manufacturer's system, consider providing separate indicator as specified below.

* + - * 1. [Manufacturers](http://www.specagent.com/LookUp/?ulid=11934&mf=04&src=wd):

SeaMetrics, Inc., (800) 975-8153, 19026 72nd Ave. S, Kent, WA 98032.

Approved equivalent.

Insert descriptive specifications below to identify Project requirements and to eliminate conflicts with products specified above.

* + - * 1. Description:

Integrally mounted in transmitter housing.

Scale: Graduated.

Length: [**<\_\_\_\_\_\_\_\_> inches**] [**As indicated on Drawings**].

Units: gpm.

Mounting: [**Wall**] [**Panel**].

* + - 1. RECORDERS
         1. [Manufacturers](http://www.specagent.com/LookUp/?ulid=11935&mf=04&src=wd):

Foxboro, (866) 746-6477, 33 Commercial Street, Foxboro, MA 02035.

Honeywell International Inc., (518) 452-6646, 1 Executive Centre Dr, Albany, NY 12203.

Approved equivalent.

Insert descriptive specifications below to identify Project requirements and to eliminate conflicts with products specified above.

* + - * 1. Description:

Minimum Diameter: 10 inches.

Rotation Cycle: Once per [**day**] [**week**] [**month**].

Drive Mechanism:

Synchronous motor.

<**\_\_\_\_\_\_\_\_**> Vac, <**\_\_\_\_\_\_\_\_**> Hz.

* + - 1. INTEGRATORS

If indicators not included as part of flow meter manufacturer's system, consider providing separate indicator as specified below.

* + - * 1. [Manufacturers](http://www.specagent.com/LookUp/?ulid=11936&mf=04&src=wd):

Precision Digital Corporation, (800) 343-1001, 233 South St, Hopkinton, MA 01748

SeaMetrics, Inc., (800) 975-8153, 19026 72nd Ave. S, Kent, WA 98032.

Approved equivalent.

Insert descriptive specifications below to identify Project requirements and to eliminate conflicts with products specified above.

* + - * 1. Description:

Totalize flow in specified units.

Interface with specified flow meter assembly.

Accuracy: Plus or minus 0.25 percent of full scale.

* + - 1. OPERATION
         1. Control Power:

Wiring: As specified in Section 260503 - Equipment Wiring Connections.

Voltage: 120 V ac, single phase, 60 Hz.

Furnish local transformers as required.

* + - * 1. Enclosures: NEMA [**4**] [**4X**] [**As indicated on Drawings**] <**\_\_\_\_\_\_\_\_**>.
      1. METER BOXES
         1. As specified in Section [**330563 - Concrete Vaults and Chambers**] [**330577 - Fiberglass Metering Manholes**] <**\_\_\_\_\_\_-\_\_\_\_\_\_\_\_\_\_\_\_**>.
      2. SOURCE QUALITY CONTROL
         1. Provide shop inspection and testing of meters.
         2. Test meters according to AWWA M6.

Include one or both of following paragraphs to require Director’s inspection or witnessing of test at factory.

* + - * 1. Director’s Inspection:

Make completed flow meter available for inspection at manufacturer's factory prior to packaging for shipment.

Notify Director’s Representative at least [**seven**] <**\_\_\_\_\_\_\_\_**> days before inspection is allowed.

* + - * 1. Director’s Witnessing:

Allow witnessing of factory inspections and tests at manufacturer's test facility.

Notify Director’s Representative at least [**seven**] <**\_\_\_\_\_\_\_\_**> days before inspections and tests are scheduled.

Include following paragraph if reliance on manufacturer's approved quality-control program is sufficient for Project requirements.

* + - * 1. Certificate of Compliance:

If manufacturer is approved by authorities having jurisdiction, submit certificate of compliance indicating Work performed at manufacturer's facility conforms to Contract Documents.

Specified shop tests are not required for Work performed by approved manufacturer.

1. EXECUTION
   * + 1. EXAMINATION
          1. Verify that building service connections and municipal utility water main sizes, locations, and elevations are as indicated on [**Shop**] Drawings.
       2. PREPARATION
          1. Before attaching meter, ensure that pipe ends are deburred, square, and plumb and that scale and dirt on inside and outside of piping has been removed.
          2. Prepare pipe connections to equipment with flanges or unions, as appropriate.
          3. Protect and support existing distribution piping as Work progresses.
       3. INSTALLATION
          1. Meters:

Install meters according to AWWA M6, with isolating valves on inlet and outlet.

[**Provide full line-size bypass with globe valve.**]

* + - * 1. Meter Boxes:

As specified in Section [**330563 - Concrete Vaults and Chambers**] [**330577 - Fiberglass Metering Manholes**] <**\_\_\_\_\_\_-\_\_\_\_\_\_\_\_\_\_\_\_**>.

* + - 1. FIELD QUALITY CONTROL
         1. Testing:

Test and calibrate flow meter to demonstrate specified accuracy requirements.

Test meters according to AWWA M6.

* + - * 1. Manufacturer Services: Furnish services of manufacturer's representative experienced in installation of products furnished under this Section for not less than <**\_\_\_\_\_\_\_\_**> [**days**] [**hours**] on Site for installation, inspection, startup, field testing, and instructing Facility personnel in maintenance of equipment. Coordinate with Director’s Representative.
        2. Equipment Acceptance:

Adjust, repair, modify, or replace components failing to perform as specified and rerun tests.

Make final adjustments to equipment under direction of manufacturer's representative.

* + - * 1. Furnish installation certificate from equipment manufacturer's representative attesting that equipment has been properly installed and is ready for startup and testing.
      1. DEMONSTRATION
         1. Demonstrate equipment startup, shutdown, routine maintenance, and emergency repair procedures to Facility personnel.
      2. ATTACHMENTS

When relying on separate schedules, tables, illustrations, or forms to specify product requirements, include list of each attachment. Include identical list of attachments in Project Manual table of contents.

Insert attachments following END OF SECTION. Consider following example when developing Project schedule.

* + - * 1. Water Meters:

FE/FIT-463:

[**Manufacturer: <\_\_\_\_\_\_\_\_>.**]

[**Model: <\_\_\_\_\_\_\_\_>.**]

Location: <**\_\_\_\_\_\_\_\_**>.

Type: <**\_\_\_\_\_\_\_\_**>.

Size: <**\_\_\_\_\_\_\_\_**>.

Flow Rate Range: <**\_\_\_\_\_\_\_\_**>.

Output Signal: <**\_\_\_\_\_\_\_\_**>.

Meter Box Depth: <\_\_\_\_\_\_\_\_> inches

FE/FIT-464:

[**Manufacturer: <\_\_\_\_\_\_\_\_>.**]

[**Model: <\_\_\_\_\_\_\_\_>.**]

Location: <**\_\_\_\_\_\_\_\_**>.

Type: <**\_\_\_\_\_\_\_\_**>.

Size: <**\_\_\_\_\_\_\_\_**>.

Flow Rate Range: <**\_\_\_\_\_\_\_\_**>.

Output Signal: <**\_\_\_\_\_\_\_\_**>.

Meter Box Depth: <\_\_\_\_\_\_\_\_> inches

END OF SECTION 331900