SECTION 33 19 13

WATER METERS FOR service line installations

# GENERAL

## SUMMARY

### Section includes general information, products, and execution for water meters for service line installations.

### Related Sections:

#### SECTION 01 60 00 – MATERIAL AND EQUIPMENT

#### SECTION 01 78 23 – OPERATION AND MAINTENANCE DATA

#### SECTION 01 91 00 (.01 or .02) – COMMISSIONING

## REFERENCES

### American Society of Mechanical Engineers (ASME):

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

### American Water Works Association (AWWA):

#### C116 – Protective Fusion-Bonded Coatings for the Interior and Exterior Surfaces of Ductile-Iron and Gray-Iron Fittings

#### C700 – Cold-Water Meters – Displacement Type, Metal Alloy Main Bronze Main Case

#### C707 – Encoder-Type Remote-Registration Systems for Cold-Water Meters

### ASTM International (ASTM):

#### A 48 – Standard Specification for Gray Iron Castings

### Denver Water (DW):

#### Engineering Standards, 16th Edition

### NSF International (NSF):

#### 61 – Drinking Water System Components – Health Effects

#### 372 – Drinking Water System Components – Lead Content

## DEFINITIONS

### AMR: The technology of automatically collecting consumption, diagnostic, and status data from water meter or energy metering devices and transferring that data to a central database for billing, troubleshooting, and analyzing.

### AMI: An integrated system of smart meters, communications networks, and data management systems that enables two-way communication between utilities and customers.

### ERT: Technology used to transmit data from utility meters over a short range so a utility vehicle can collect meter data without a worker physically inspecting each meter.

### Magnetic Drive Meters: Meters that measure fluid flow by the voltage induced across the liquid by its flow through a magnetic field.

### Nutating Disc: A type of meter that operates by having a disc mounted to a central ball. When fluid enters the chamber, it causes the disc to wobble (nutate), transferring the displaced volume to the register.

### Oscillating Piston: A type of meter that contains a precision machined chamber containing a cylindrical piston that oscillates as liquid flows through it.

## SUBMITTALS

### Warranty documentation.

### O&M documentation as specified in SECTION 01 78 23.

### Product Data:

#### Manufacturer.

#### Material.

#### Equipment drawings and data.

#### Provide list, which indicates use, operating range, total range, and location for manufactured components.

#### Include data substantiating that materials are in accordance with the requirements.

### Informational Submittals: Product certificates for each type of meter from the Manufacturer.

### Quality Control:

#### The Manufacturer shall submit a written statement that the inspection and the specified tests have been completed and the results comply with the requirements of these standards and are in accordance with NSF/ANSI 61 and NSF/ANSI 372 certifications.

#### Documentation tag.

### Closeout Submittals:

#### As-Built Drawings: Submit complete As-Built Drawings of Work, including interface with other Work.

#### Record actual locations of components and instrumentation.

## QUALITY ASSURANCE

### Meters shall adhere to the referenced AWWA and NSF standards.

### Documentation Tag:

#### Firmly attached to meter.

#### Identifying characteristics:

##### Nominal size.

##### Manufacturer.

##### Meter number.

##### Register type and model number.

#### Manufacturer’s serial number.

#### DW meter number.

#### Form 39 bar code representation of the DW meter number.

#### Manufacturer’s certified test results.

### Meter Number:

#### The DW meter number shall be plainly stamped or engraved on the meter main case.

#### Heat stamped in a contrasting color on the plastic register cap.

#### Attached to the meter in form 39 bar code using a separate tag.

#### Paper or plastic number labels affixed to the register are not acceptable.

#### Manufacturer’s serial numbers shall run consecutively for each meter in the group ordered and stamped on the top of the register cap.

## DELIVERY, STORAGE, AND HANDLING

### As specified in SECTION 01 60 00.

## WARRANTY

### The manufacturer shall provide a full unconditional 1-year warranty covering the components of the meters, registers, and register boxes.

# PRODUCTS

## APPROVED MANUFACTURERS

### Meter Registers and Register Boxes:

#### Badger Meter, Inc.

##### HR-E

##### HR-E LCD

#### Mueller Systems – Hersey Products, Inc.

##### Translator Encoder Register

#### Neptune Technology Group

##### ProCoder

### Magnetic Drive Displacement Type Water Meters:

#### Badger Meter, Inc.

##### Recordall Disc Series

#### Mueller Systems – Hersey Products, Inc.

##### 400 IIS Model

##### 500 IIS Model

#### Neptune Technology Group

##### T-10 Meter

## MATERIALS

### Components in contact with potable water shall be certified to comply with NSF/ANSI 61 and NSF/ANSI 372.

## COMPONENTS

### Meter Registers and Register Boxes:

#### Required for magnetic drive type meters.

#### General:

##### Meters shall be compatible with the AMR/AMI system in use by the OWNER and furnished with registers in accordance with AWWA C707 with the following additional requirements or exceptions.

###### The AMR system: Itron Model 100W series ERT.

###### ERTs: Return to the Manufacturer at their end of life to divert unnecessary waste from the landfill.

###### AMI system: Badger Orion Cellular LTE Endpoint.

#### Registers and register boxes:

##### Registers:

###### Electronic pulser or electronic digital encoder with a permanent potted wire connection for the AMI or ERT unit.

###### Factory-wired and potted to a 5 feet long minimum wiring harness with a female, watertight, quick-connect terminal approved by Itron.

Wire lengths will be indicated by DW.

###### Delivered preprogrammed to provide electronic readings for up to nine digits, as appropriate for the brand of meter.

###### Electronic precision for a pulser register shall be 1 gallon; an encoder register shall be 50 gallons or less.

###### Compatible with both:

Itron Model 100W series ERTs using Itron WYSIWYG ROCLs.

Badger Orion Cellular LTE Endpoint.

###### Straight reading, magnetic drive, U.S. gallons that are permanently sealed and protected from the environment.

###### Protected from tampering by the inclusion of a formed joint that can be unsealed only by the destruction of one or more of the components that form the joint.

##### The register box shall attach to the outer case of the meter by an interior or exterior locking device.

#### Mechanical register dials:

##### Manufactured in accordance with AWWA C700, Table 4.

##### Number wheels or stationary zeros used for billing purposes (1,000 gallons and up) shall have black numbers against a white background.

##### Digits under 1,000 gallons, whether stationary or movable, shall have white numbers with a black background or shall be indicated by a box on the dial face.

##### Register equipped with a test hand and test index circle or a test hand and graduated test number wheel.

#### Register cap:

##### Register boxes equipped with a register cap that completely covers the register lens.

##### Register cap capable of being moved to another register in the event the meter is moved.

### Magnetic Drive Displacement Type Water Meters:

#### In accordance with AWWA C700.

#### Size: 5/8 inch through 2 inches nominal diameters.

#### Meter description:

##### Nutating disc or oscillating piston type.

##### Meters of size 1 1/2 inches and 2 inches:

###### Internal parts easily removable to not disturb the connections to the pipeline and for removal of the meter.

###### SST mounting bolts.

###### Flange gaskets.

#### Meter main cases and flanges:

##### Constructed of copper alloy in accordance with AWWA C700.

##### Flanges:

###### For 1 1/2 inches and 2 inches, two-hole, oval type and shall not contain slotted holes.

###### An integral part of the main case and composed of the same material.

###### Not removable from the main case.

##### Serrated finish in accordance with AWWA C702.

##### A test port supplied on the outlet side of the meter.

#### Registers and register boxes: Provide in accordance with the requirements of this Section.

#### Bottom plates:

##### Breakable design for 5/8 inch through 1-inch meters.

##### CI construction.

##### Coated with baked enamel to protect from corrosion.

##### Provided with a plastic line that does not prevent the bottom plate from breaking as designed.

#### Piston/disc spindles, thrust rollers, thrust roller bearing plates, and measuring chamber diagrams:

##### In accordance with AWWA C700.

##### Monel, SST, or a suitable engineering plastic.

#### Drive spindle or upshaft:

##### SST or a suitable engineering plastic.

##### Driving pawl and magnet securely fastened to the drive spindle in a manner that prevents the loss of the pawl during normal operation of the water meter.

#### External fasteners: SST in accordance with AWWA C700.

# EXECUTION

## GENERAL

### Meters:

#### Meter installations can proceed after the meter is tested and numbered by DW.

#### Registers and associated AMR/AMI devices shall be fully compatible with the meter reading system in use where the meter is installed.

#### The Meter Inspection Supervisor will determine the AMR/AMI system to be used.

#### Meter installations, 2 inch and smaller, will be inspected by DW after final grade is established at a minimum of 5 feet radially around the meter setting.

#### AMR/AMI device will be installed by DW personnel at the time the meter installation is inspected and at the expense of the Owner of the premises.

#### Meters shall be the same size as the corporation stop or service tee and that portion of the service pipe between the meter and the corporation stop.

#### Meters smaller than 3/4 inch shall not be installed unless it is to serve as a replacement for an existing meter of the same size.

#### DW may allow for the installation of a meter that is smaller than the service pipe provided the service pipe is reduced to the size of the meter for a distance of no less than 10 times the larger pipe diameter on the inlet side of the meter, or 5‑feet, whichever is longer.

### Outside Meter Setting:

#### Outside meters shall be installed with the inlet and outlet spuds in a horizontal position and housed in a concrete or approved composite meter pit or vault in accordance with the Standard Drawings.

#### Meter shall be installed in an approved coppersetter or yoke.

#### Coppersetters for 1 inch and smaller meters shall be installed with the meter spuds located 18 inches below the meter pit lid to facilitate maintenance and replacement.

#### The meter shall sit horizontally with the meter register pointing up.

#### Larger meters shall be installed in vaults in accordance with the Standard Drawings.

#### Deviations in installation height, spacing, pipe location, mounting supports, and other details need to be approved in advance in writing by the Meter Inspector.

### Inside Meter Setting:

#### Inside meter settings are not permitted on water service connections without the written approval of the Meter Inspection Supervisor prior to the installation of the service connection at the main.

#### An inside meter setting request shall be accompanied by an explanation for its need, a site plan drawing to scale showing exact locations of the proposed water facilities with building footprints and paved areas, an indication of the means by which DW will gain access to the meter during normal business hours, and a detailed, dimensioned plan and profile of the meter room that shows piping, equipment, and other water‑related facilities such as fire sprinkler controls and BFPAs.

#### Existing inside meter settings on water service connections are permitted to remain provided there are no changes made to the tap, the service line, or the meter setting.

#### The meter shall be relocated to an outside meter pit or vault if the structure containing an inside meter is to be reconstructed, considerably remodeled, or the service line is to be reconstructed, relocated, or replaced.

#### Inside meter settings are for use with 1 1/2 inch and larger meters where there is inadequate room for the proper installation of a meter vault after exhausting other reasonable alternatives.

#### Inside settings will be permitted for industrial and commercial properties and multi‑family premises where full‑time, on‑site management is provided and directly accessible from a public ROW.

#### Safe, unimpeded access during DW’s normal working hours shall be provided by the licensee.

#### Written approval to use an inside meter shall be obtained from the Meter Inspection Supervisor prior to tapping the water main.

#### If the tap is already installed, written approval shall be obtained prior to converting the stub‑in to a service line.

#### Specific details of meter type, location, access requirements, AMR/AMI configuration, piping, valves, and other requirements will be assessed and approved on a case‑by‑case basis by the Meter Inspection Supervisor in consultation with the Meter Inspector.

#### An inside meter installation shall be in accordance with the CAD drawing files as detailed in DW’s CAD Standards External Requirements.

#### Where approved, inside meter installations shall be in accordance with the following requirements:

##### The total length of the service line measured from the street main to the inlet valve of the meter shall be 60 feet or less.

##### The space containing the meter shall be heated to prevent the freezing of pipes and equipment and shall contain a floor drain within 10 feet of the meter.

##### The space shall be accessible to DW’s meter maintenance and meter reading employees during DW’s normal working hours with minimal delay.

##### The meter shall be located immediately adjacent to the point where the domestic service enters the building through the foundation wall with a minimum amount of exposed pipe before the meter.

##### Meters shall be bolted in place in a flanged DI pipe system with a BSTC on the outlet side of the meter.

##### Gate valves shall be used on the meter inlet and outlet and on the bypass. Valves shall be non-rising stem, clockwise opening, and mounted vertically. The bypass pipe shall be no greater than 6 feet above the floor and a minimum of 2 1/2 feet above the meter; allow for at least 2 feet of clearance to the wall.

##### For any installation where a BFPA is not required, a check valve shall be installed 5 feet downstream of the meter.

##### The top of the meter shall be a maximum of 40 inches above the floor.

##### BFPAs, PRVs, and other components shall be installed after the meter and downstream bypass tee. In most cases, there shall be 5 feet of pipe between the bypass tee and the first component.

##### One or more indoor AMI devices or outdoor remote AMR devices are required for inside meter settings, the location of which will be determined during the review of the inside meter request.

### AMR and AMI Equipment:

#### Meters, with the exception of those in Master Meter Contract Areas, shall be equipped with the AMR/AMI device determined by DW and installed in accordance with DW’s instructions in a location that allows for the collection of a radio signal by collection equipment.

#### Special metering and AMR/AMI systems may be required for services connected to water mains in easements.

#### The register of each meter shall be equipped with an AMR/AMI device and mounted, as directed by the Meter Inspector.

#### In most cases, the meter shall be equipped with the latest model of Itron Pit ERT.

#### In special circumstances identified by the Meter Inspector, AMI or a remote AMR device may be required at a distance of up to 150 feet of wire length from the meter pit to the vault and mounted on the outside of the building, on a post, or on another structure.

#### The signal wire (Belden #9451) for remote AMR device installations shall be run through 1‑inch PVC conduit at a minimum.

##### For most installations on 1 inch and smaller meters, the AMR/AMI device shall be mounted through the CI meter pit lid or beneath the composite meter pit or vault lid .

##### For most installations on 1 1/2 inch and larger meters, the AMR/AMI device shall be mounted beneath the manhole lid. For some installations on 3 inch and larger meters, a remote AMR device with the signal cable in a conduit may be required. This determination will be made on a case-by-case basis. The Meter Inspector will provide direction as to the type and location of the AMR/AMI device required during the mandatory Pre-Construction Meeting for meter installations. One AMR/AMI device is required for each meter register.

##### For existing meter installations of any size, DW will make determinations to change the meter pit or vault lid and AMR device mounting at its discretion and cost. Such installations may incorporate adapters and special mounting equipment selected and approved by DW.

##### Where inside meter settings are approved in advance in writing by the Meter Inspection Supervisor, AMI or remote AMR devices shall be installed on the outside of the building as directed by DW. The licensee shall provide the approved signal cable in a conduit from the location of the meter to the mounting location of the AMR device; the length of the signal cable shall not exceed 150 feet.

##### Special circumstances: Any meter setting , including inside meter settings, will need to be approved in writing by DW’s Meter Inspector before construction. If it is necessary to obtain radio signals using drive by equipment from a public street or via a meter reading network, DW may require the installation of a remote AMR device, radio repeater, network collector, and/or other special equipment or installation configuration installed at the expense of the licensee. Some meter reading devices may require the licensee to provide a mounting location and an electric power source.

### Construction: The CONTRACTOR shall be a licensed plumber by the AHJ to perform work in the public ROW and have a current plumbing license to install service lines inside Denver, Total Service, and Read and Bill Contract Areas where work is to be performed.

## STARTUP

### Startup and commissioning requirements for the equipment specified herein as specified in SECTION 01 91 00.

## ADJUSTING

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

END OF SECTION