

Section 02526

WATER METERS

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Water meters, submeters, and fire service meters.

1.02 MEASUREMENT AND PAYMENT

A. Unit Prices

1. Measurement for water meters is on unit price basis for installation of each meter type and size.
2. Payment includes vault, piping and appurtenances necessary for complete installation of meter.
3. Measurement for relocating and reinstalling meter with new box is on unit price basis for each meter relocated and reinstalled.
4. No separate payment for adjustment of meter or meter box unless otherwise shown in Drawings.
5. Refer to Section 01270 - Measurement and Payment for unit price procedures.

- B. Stipulated Price (Lump Sum). If Contract is Stipulated Price Contract, payment for work is in this Section is included in total Stipulated Price.

1.03 REFERENCES

- A. ASME B 16.1 - Cast-Iron Pipe Flanges and Flanged Fittings.
- B. AWWA C 510 - Standard for Double Check Valve Backflow - Prevention Assembly.
- C. AWWA C 700 - Standard for Cold-Water Meters - Displacement Type.
- D. AWWA C 701 - Standard for Cold-Water Meters - Turbine Type for Customer Service.
- E. AWWA C 702 - Standard for Cold-Water Meters - Compound Type.
- F. AWWA C 703 - Standard for Cold-Water Meters - Fire Service Type.

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

1.04 SUBMITTALS

- A. Conform to requirements of Section 01330 - Submittal Procedures.
- B. Submit written certification of calibration and test results.
- C. Submit manufacturer's certification that meters meet applicable requirements of this Specification Section.
- D. Submit accuracy registration test certification from manufacturer for each 3 inch through 10 inch diameter meter.

1.05 QUALITY CONTROL

- A. Submit manufacturer's warranty against defects in materials and workmanship for one year from date of Substantial Completion..
- B. Provide vendor's unconditional guarantee that performance of each meter meets applicable AWWA standards and AWWA Manual M6 as follows:

- 1. Displacement type: 10 years from installation or register registration shown below, whichever comes first

Size	Registration (million gallons)
5/8", 3/4"	1.5
1"	2.5
1-1/2"	5.0
2"	10.5

- 2. Turbine type: 1 year from date of installation
- 3. Compound type: 1 year from date of installation
- 4. Fire service type: 1 year from date of installation

Operations of hermetically sealed register, 5/8-inch to 2-inch diameter, shall be unconditionally guaranteed for 15 years.

- C. Provide manufacturer's unconditional guarantee for each sealed register against leakage, fogging, discoloration and stoppage for 15 years from date of installation.

- D. Vendor may replace meters that become defective within guarantee period with meters that comply with this Specification. City will return defective meters to vendor at expense. Meters repaired or replaced under this guarantee must meet accuracy limits for new meters upon receipt and accuracy limits for remaining period of initial guarantee.

1.06 EASEMENT REQUIREMENTS

- A. Install two-inch and smaller water meters and shut-off valves (stop boxes) at right-of-way line when possible. Otherwise, install within 5 foot by 5-foot water meter easement.
- B. Except for ten-inch fire service compound water meters, install three-inch and larger water meters within minimum of 10 foot by 20-foot water meter easement.
- C. Install ten-inch fire service proportional or compound water meters within minimum of 10 foot by 25-foot water meter easement.
- D. Locate water meter easements contiguous with public right-of-way unless approved by City Engineer. Provide minimum fifteen-foot wide access easement when not contiguous with public right-of-way.

PART 2 PRODUCTS

2.01 GENERAL

- A. Provide meters of type and size as indicated on Drawings, unless otherwise indicated.
- B. Provide bolted split casings. Main casings of meters and external fasteners: Copper alloy with minimum 75 percent copper for 5/8 inch to 2 inches, bronze or cast iron, hot-dipped galvanized or epoxy coating for 3 inches and larger.
- C. Straightening Vanes: Non-corrosive material compatible with case material.
- D. Intermediate gear train shall not come into contact with water and shall operate in suitable lubricant.
- E. Registers: Automatic Meter Reading (AMR) type that provides pulse, contact closure, piezo switch or encoder generated output signal, compatible with City's radio and telephone AMR systems. Provide minimum 12-foot wire when permanently connected to register. Lens: impact resistant. Register box: tamper resistant by means of tamper screw or plug; Register: permanently sealed, straight reading, center-sweep test hand, magnetic driven, U.S. gallons. Digits: 6, black in color with lowest registering three digits (below 1,000-gallon registration) having contrasting digit and background color. Register capacity of meters: 9.99 million gallons for 5/8 inch to 2 inches and 999.999 million gallons for 3 inches and larger.

- F. Connections: 5/8 inch to 1 inch: threads at each end; 1-1/2 to 2 inches: two-bolt oval flanges each end; 3 inches and larger: flange at each end.
- G. Stamp manufacturer's meter serial number on outer case. Stamp manufacturer's meter serial number on outside of register lid when provided. Manufacturer's serial numbers shall be individual and not duplicated.
- H. Meters: Equip with AMR type register to connect to City of Tomball's AMR system. Compound Meter manufactured by: Badger, Hershey Products, Neptune, Sensus or approved equal. Turbine Meters shall be manufactured by Badger, Hershey Products, Neptune, Sensus or approved equal. Fire service Meters shall be manufactured by Hershey Products, Neptune, Sensus or approved equal. Displacement meters shall be Badger, Neptune, Hershey, Kent, Sensus, or approved equal.
- I. Manufacturing Quality Control shall permit successful interchangeability from one meter to another of same size including registers, measuring chambers and units, discs or pistons as units, change gears, bolts, nuts, and washers without affecting accuracy of new meter.
- J. For water meter vaults provide:
 - 1. 1/4" steel or aluminum with stainless steel hinge pins. Door shall open to 90 degrees and automatically lock in that position.
 - 2. Use meter vault covers manufactured by Bilco, Halliday Products, Pennsylvania Insert Corporation, or approved equal.

2.02 METER APPLICATIONS

- A. Sizes 5/8" to 2" Meters: Displacement type (except for constant flow where 2-inch turbine may apply).
- B. Sizes 3" and above Meters:
 - 1. Turbines:
 - Processing plants
 - Manufacturing facilities
 - Lawn sprinkler systems
 - Effluent water in treatment plants
 - Booster (pump) stations
 - Level controlled tank filling operations
 - Fire hydrants (transients)
 - Inter-systems sale or transfer
 - Sewer credit/sub-meter

2. Compounds:

Multi-family dwellings

Motels and hotels

Hospitals

Schools

Restaurants

Office buildings

Dormitories, nursing homes, department stores, shopping malls, and other commercial establishments

Note: Provide fire service type for sizes larger than 6 inches.

3. Fire Service Type: For designated fire protection lines. Provide proportional or compound type fire service meter assembly (AWWA C 703) when customer elects to use combination of potable and fire protection services in lieu of separate domestic meters and fire services.

2.03 MATERIALS

A. Cold-Water Meters:

1. Displacement Type: AWWA C 700; sizes 5/8 inch up to and including 2 inches; oscillating disc or piston of magnetic drive type; bolted split-case design, with either being removable.
2. Turbine Type: AWWA C 701; Class II; sizes 3 inches through 10 inches; flanged; straight-through measuring chamber; rotor construction: polypropylene or similar non-rubber material with specific gravity of approximately 1.0, equipped with near frictionless replaceable bearings in turbine working against rotor shaft positioned thrust bearing. Transient/Fire Hydrant Meter Inlet: Female fitting for attachment to hose nozzle with National Standard Fire hose thread. Outlet: 2-inch nipple with National Pipe Thread. Include restriction plate to limit flow through meter to 400 gpm at 65 psi.
3. Compound Type: AWWA C 702; sizes 2 inches through 6 inches. Measuring chambers: For use in continuous operation; separate units of copper alloy (minimum 84 percent copper) or approved polymer material, inert in corrosive potable water; with centering device for proper positioning. Measuring pistons: Non-pilot type with division plates of rubber covering vulcanized to stainless steel or other approved material of sufficient thickness to provide minimum piston oscillation noise. Measuring discs: Flat or conical type, one piece, mounted on monel or 316 stainless steel spindle. Measuring chamber strainer screen area: Twice area of main case inlet.

4. Fire-Service Type: sizes 4 inches through 10 inches; turbine-type, compound type, proportional type; AWWA C 703, with separate check valve conforming to AWWA C 510. Determine size of fire meter by adding fire flow and domestic flow.

2.04 STRAINERS

- A. Displacement Potable Water Meters 5/8 inch through 2 inches: Self-straining by means of annular space between measuring chamber and external case or with strainer screens installed in meter. Provide rigid screens which fit snugly, are easy to remove, with effective straining area at least double that of main case inlet.
- B. Potable Water Meters 2-inch diameter and larger: Equip with separate external strainer with bronze body for diameters less than 8 inches. Eight-inch diameter and larger may be cast iron, hot-dipped galvanized or epoxy coating. Strainers: Bolted to inlet side of meter, detachable from meter, easily removable lid. Strainer screen: Made of rounded cast bronze, stainless steel wire, having nominal screen size of 3-1/2 mesh-per-inch (U.S. Series) not less than 45 percent clear area.
- C. Provide separate external strainers (when required by meter manufacturer) approved for use in fire service metered connections by Underwriters Laboratories. Bodies: Cast iron or copper alloy. Ends: Flanged in accordance with ASME B 16.1, Class 125. Provide stainless steel basket. Strainers shall be detachable from meter. Manufacturers shall be by Badger, Hershey, Neptune, Sensus, or approved equal.

2.05 CONNECTIONS AND FITTINGS

- A. Provide pipe for connections in accordance with Section 02501 - Ductile Iron Pipe and Fittings and Section 02506 - Polyvinyl Chloride Pipe. Use restrained joints and flanged joints only.
- B. Fittings:
 1. For meters 2 inches and smaller: Same type of fittings as Outlet End fittings for Curb Stop in accordance with Section 02512 - Water Tap and Service Line Installation.
 2. For meters 3 inches and larger: Restrained ductile iron; push-on bell joints or mechanical joint fittings between water line and meter vault; Class 125 flanged inside meter vaults; cement mortar lined and sealed.

2.06 LAYING LENGTHS

- A. Minimum laying lengths for meter and standard strainer shall be as shown on Drawings.

PART 3 EXECUTION

3.01 TAPPING AND METER SERVICE INSTALLATION

- A. Refer to Section 02525 - Tapping Sleeves and Valves for tapping requirements.
- B. Meter Service Line:
 - 1. Use pipe and fittings conforming to requirements of Section 02501 - Ductile Iron Pipe and Fittings, or Section 02506 - Polyvinyl Chloride Pipe.
 - 2. Limit pulling and deflecting of joints to limits recommended by manufacturer.
 - 3. Make vertical adjustments with offset bends where room will permit. Minimize number of bends.
 - 4. Provide minimum of ten pipe diameters of straight pipe length upstream and downstream of meter vault.

3.02 METER FITTING HOOKUP

- A. Support meter piping and meter, level and plumb, during installation. Support meters 3 inches and larger with concrete at minimum of two locations.
- B. Use round flanged fittings inside meter box or vault except for mechanical joint to flange adapter. Provide full-face 1/8-inch black neoprene or red rubber gasket material on flanged joints. Provide bolts and nuts made from approved corrosion-resistant material.
- C. Tighten bolts in proper sequence and to correct torque.
- D. Visually check for leaks under normal operating pressure following installation. Repair or replace leaking components.

3.03 METER BOX AND VAULT INSTALLATION

- 1. Conform to requirements of Section 02085 - Valve Boxes, Meter Boxes, and Meter Vaults.
- 2. Perform adjustment to existing meter in accordance with Section 02085 - Valve Boxes, Meter Boxes, and Meter Vaults.

3.04 TESTING

- A. Accuracy registration tests will be conducted in accordance with latest revision of AWWA standard for type and size of meter.

1. Tests will be run by City of Tomball on meters prior to installation at City’s meter repair shop. Meters 2 inches and smaller will be tested at random at City's discretion. All 3 inches and larger meters will be tested.
2. Accuracy of displacement meters during guarantee period shall be as follows:
 - a. Initial period: of 18 months from date of shipment or 12 months from date of installation: 98.5% to 101.5% at standard and minimum flow rates; 98% to 101% at low flow rates.
 - b. Second period: AWWA new meter accuracy as tested below.

<u>Meter Size</u>	<u>GUARANTEE PERIOD</u>		<u>TEST FLOW RATE</u>	
	Age of Meter <u>Years</u>	<u>or</u> Million* <u>Gallons</u>	<u>Minimum Rate (gpm)</u>	
5/8"	>1 to <5	0.5	1/4	
1"	>1 to <5	1.0	3/4	
1-1/2"	>1 to <5	2.5	1-1/2	
2"	>1 to <5	5.5	2	

* Total registration.

- c. Third period: AWWA new meter accuracy for standard flow rates and AWWA repair meter accuracy for minimum flow rate as tested below.

<u>Meter Size</u>	<u>GUARANTEE PERIOD</u>		<u>TEST FLOW RATE</u>		
	Age of Meter <u>Years</u>	<u>or</u> Million* <u>Gallons</u>	<u>Standard Flow Rates (gpm)</u>	<u>and</u>	<u>Minimum Rate (gpm)</u>
5/8"	>5 to <10	1.5	2-15		1/4
1"	>5 to <10	2.5	4-40		3/4
1-1/2"	>5 to <10	5.0	8-50		1-1/2
2"	>5 to <10	10.0	15-100		2

* Total registration.

3. Minimal acceptable accuracy in percent of low flow registration for turbine meters:

<u>Meter Size</u>	<u>Minimum Flow</u>	<u>% Accuracy Required</u>
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<u>(inches)</u>	<u>(gpm)</u>	
2	3	95
3	5	95
4	15	95
6	20	95
8	20	95
10	30	95

END OF SECTION