

PURPOSE OF METERS

Primary function of a meter: To measure and display the amount of water passing through it.

Uses:

- 1.) Costs according to customer use bill for exact amount of water used.
- 2.) Flow measurement amount of water produced and pumped.
- 3.) System Control .
- 4.) Influent and effluent measurement.
- 5.) Blending of waters.
- 6.) Chemical Dosages.
- 7.) How efficiently system is operating.
- 8.) Reduces water consumption.
- 9.) Losses of water can be detected.
- 10) Connections to other Utility systems.
- 11) Reservoir outlets.
- 12) Pumping stations.

The information obtained from metering can show how efficiently the water utility is operating.

Losses of water can be detected by comparing service meter and hydrant use meter readings with production meter reading.

TYPES OF METERS

1.) **Displacement - Type** : used for water service lines to most residence up to (2) two inches in size. Commercial services as large as (6) six inches in size.

This type of meter works by measuring and registering the number of times the meter chamber, whose volume is known, is filled and emptied. In this chamber, usually cylindrical in shape, a piston or disc goes through a certain cycle of motion that corresponds to a single filling and emptying of the chamber. This movement is transferred to a register.

ADVANTAGES: Measure wide variations of flow.

DISADVANTAGES: Over (2) two inches in size low flow rates are not detected. At high flows high head loss. Foreign matter or corrosion will stop or cause loss of accuracy.

TYPES: (A) Most Common: nutating-disc made with a break-away bottom plate that breaks away when frozen to prevent damage caused by freezing.

(B) Piston Type: this type has a slightly higher head loss.

- 2.) **Turbine meters** : used for large flows. Inaccurate for small flows.
- 3.) **Propeller meters** : not to be used in low flows or stop and go operations.
- 4.) **Compound meters** : used where the water demand varies widely. Accurate over a wide range with only a slight reduction in accuracy at the transition point between the two meter types within the unit.
- 5.) **Proportional meter** : relatively accurate but difficult to maintain.
- 6.) **Venturi meter** : accurate for a large range of flows and has very little friction loss.
- 7.) **Orifice type meters** : this type of metering is often used by water utilities to locate leaks and to measure the flow from fire hydrants.
- 8.) **Rotometers** : narrow range of accuracy. Mainly used in industrial plants.
- 9.) **Magnetic meter** : electric current is measured and converted to a measure of water flow.
- 10.) **Sonic meters** : these meters contain sensors (transducers) attached to the sides of a pipe.

Velocity - Type Meters :

Include turbine, propeller, venturi, insertion type and most electronic water meters.

Used for high flow rates such as main lines, pumps, irrigation, golf courses, industrial and other high flows.

Sometimes called current meters. Sizes up to 36 inches and larger. Actually measure the velocity of flow past a cross section of known area.

ADVANTAGES : Rugged, easy to maintain, low head loss and high rates of flow. Measure Main line pumps.

DISADVANTAGES: Unreliable at low flows.

NOTE: Both magnetic and the sonic types of meters are relatively new developments. This type of metering may be used more in the future.

VENTURI METERS:

When main lines must be metered, you want a meter that will not interfere with the flow if the meter fails.

This type of meter consists of an upstream reducer, a short throat piece, and a downstream expansion section which increases the diameter from the throat section to that of the downstream pipe, the water passing through is metered by comparing pressure at the throat and at a point upstream from the throat.

Venturi Meters are accurate over a large flow range and cause little friction loss.

Orifice plate: A thin plate with a circular hole in it installed in the pipeline between a set of flanges. Flow measurement by comparing the upstream line pressure with the reduced pressure at the orifice restriction.

ADVANTAGE: Low cost, Occupy little space.

DISADVANTAGE: Pressure loss, less reliable.

COMPOUND METERS:

Used as a compromise between the low and high flow meter.

Uses: Hotels, hospitals, factories, schools, apartment houses, commercial properties, and office buildings. (Locations with widely varying flows).

ADVANTAGES: Used for both high and low flows. Accurate low flow from a fraction of a gallon up to normal capacity of the pipeline. Will show flows as small as dripping faucets. More rugged than displacement meters.

DISADVANTAGES: Loss of head, drop in accuracy during the changeover from low to high and vice versa.

ELECTRONIC METERS:

Magnetic (“MAG METER”) Water flowing through a magnetic field induces a small electric current flow which is proportional to the water flow. This current is measured and mathematically changed to a flow measurement.

SONIC:

Sound pulses are sent alternately across the pipe in opposite diagonal directions, frequency of the sound changes with velocity of the water. An accurate measurement of water flow can be made using the difference between the frequency of the sound signal traveling with the flow of water and that traveling against the flow of water.

ADVANTAGES: Highly accurate, no head loss.

DISADVANTAGES: Adversely affected by anything which distorts the velocity of the water. This condition can make the meters so inaccurate as to be practically useless. “To prevent this” - leave at least ten pipe diameters between any upstream obstruction or fitting and the flow meter.

PROPORTIONAL METERS:

This type meter is used for fire lines and water towers.

A certain proportion of flow is diverted through a bypass meter and measured. The gears of the measuring bypass meter are adjusted to indicate on it’s register the total of water passing through the whole unit. It can be calibrated to register the full amount of water in the main pipeline. The bypass is accomplished by an orifice plate. This causes sufficient pressure differential to divert a portion of the water through the measuring meter.

ADVANTAGES: Relativity Accurate.

DISADVANTAGES: Inaccurate for low flows. Requires a large space for installation.

METER INSTALLATION PRACTICES

The choice of the size of meter installed is usually dependent on several factors :

- 1.) Maximum demand of the customer
- 2.) Average daily demand
- 3.) water main pressure at peak demand periods
- 4.) Distance from main line and elevation in excess of ten feet.

REQUIREMENTS FOR AN ACCEPTABLE METER INSTALLATION

- 1.) Water meter be watertight,
- 2.) Upstream shut - off valve of high quality and with low pressure loss,
- 3.) Positioned in a horizontal plane for optimum performance,
- 4.) Accessible for service and inspection,
- 5.) Provide easy reading directly or via a remote - reading device,
- 6.) Protected against frost, mechanical damage and tampering,
- 7.) Not be an obstacle or hazard to the customer or interfere with public safety.

METERS SMALLER THAN 1 1/2 IN. USUALLY HAVE SCREW CONNECTIONS. LARGER METERS ARE USUALLY FLANGED.

METER YOKES

Meter yokes hold the stub ends of the pipe in proper alignment and spacing. They also provide for a continuous electric ground. This serves to protect meter repairmen from a possible, dangerous electric shock under certain conditions.

NOTE: If a meter yoke is not used, then a permanently bonded electrical grounding strap should be installed on the installation.

WATER SERVICE LINES

These are the pipes that lead from the water main to the customer's water meter. (Influent side of the water meter). Normally the customer's are responsible for the pipe from the effluent side of the meter to their residence or industry.

SIZE

This depends on the pressure at the main, the distance from the main to the meter, and the quantity of water.

MATERIAL

Plastic and copper pipe are commonly used for residential service lines, whereas larger industrial service lines may be cast - iron , asbestos - cement, or other common piping material used in the distribution system.

SERVICES

Complete service lines should consists of a connection at the main, a shut off valve (CURBSTOP) or a meter with a shut off valve near or on the customer's property line. In most cases it is up to the customer to provide the line from the residence to the effluent side of the water meter pit.

The above service would call for the following materials:

METER BOX

SHUT OFF VALVE

METER

COPPER SETTING YOKE

COPPER OR PLASTIC SERVI CE LINES

CORPORATION STOP

DOUBLE CHECK VALVE ON THE EFFLUENT SIDE OF THE METER IS A GREAT SOURCE OF SYSTEM PROTECTION.

TAPPING OF THE MAIN

Digging to expose the main for tapping should be across the direction the main is running this will disturb the least amount of earth possible. A tapping saddle of the required size should then be install around the pipe to be tapped. This should be installed to allow a 45 degree angle tap. The 45 degree angle will prevent settlement and air from entering the service line. Tap the main in a

slow non forceful manner. blowout the service line before installing it to the water meter, this will prevent clogging and damage to the meter.

Wishing You the Best Now and Always

God Bless

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