Water Meter Training Objectives

To gain an understanding of:
The construction and operation of the different types of water meters
The normal application of the various water meters

Water Meters

Types:
- Positive-displacement
- Compound
- Current
- Proportional
- Venturi
- Orifice
- Magnetic
- Sonic
Positive Displacement Water Meter

Most common type of meter

Two types:

**Piston**
- piston moves back and forth as water passes
- a known volume is measured for each cycle
- motion is transmitted to the register through a magnetic drive and gears

**Nutating-disc**
- measuring chamber contains flat disc
- water flow causes disc to wobble and rotate
- rotation is transmitted to register which records volume that passed through

Positive Displacement Water Meter

Used for residential metering

Not intended for continuous flow

As positive displacement meters age and wear, they will measure less flow than actually passes through the meter.

They should be calibrated on a 10 year cycle.
Positive Displacement Water Meter

- Piston type

Current Water Meters

Used for large industrial customers
Commonly called velocity meters
Three main types:
  - **turbine**: rotors turned by flow, revolutions proportional to flow
  - **multi-jet**: similar to turbine but has multi-blade rotor
  - **propeller**: propeller turned by flow, revolutions proportional to flow

Current Water Meters

- Propeller Meter
- Turbine Meter
Compound Water Meters

Used for customers with wide variations in flow
Accurate over a wide range of flow
Three main parts:
  - turbine meter
  - positive displacement meter
  - automatic valve arrangement
During periods of low flow, water flows through positive displacement meter
As flow increases, the valve opens and allows flow through turbine meter

Proportional Water Meters

Principle of operation:
Proportional meters have an orifice which restricts flow and forces a portion of flow through the meter
Total flow is determined by reading the meter and multiplying the reading by a factor.
Proportional Water Meters

Venturi Water Meters
Principle of operation
Cross sectional area of flow path is reduced
Velocity increases while pressure goes down
Pressure is measured at two points
prior to reduction in area
at the throat of the venturi (narrow point)
Differential pressure is proportional to flow

Higher Pressure
Lower Pressure
Orifice Water Meters

Principle of operation:
Orifice plate is inserted into the pipe
Pressure is measured on both sides of the orifice
Pressure difference is proportional to the flow
Causes high head loss

Magnetic Water Meters

Principle of operation:
A conductive material flowing through a magnetic field will induce a voltage
A magnetic field is established across the pipe
The higher the flow, the higher the voltage
Voltage is proportional to flow
Often used in dirty or corrosive applications
Magnetic Water Meters

In Line Meter

Insertion type Meter

Sonic Water Meters

Principle of operation:
Ultrasonic sound waves are transmitted through the pipe and across the flowing water.

Doppler effect caused by the flowing water is measured and is proportional to the flow.

Review the lecture handout and then complete the quiz. This will help you remember the information we just covered.