



450 North Gallatin Avenue
P.O. Box 487
Uniontown, PA 15401
(412) 439-7700

ACCURATE MEASUREMENT FROM HOUSEHOLD SIZE WATER METERS

A meter is installed in the water service line of a home to accurately measure the water being consumed. The accuracy of the meter is guaranteed by its manufacturer when it is purchased by the water utility. Limits on the accuracy are set by standards established for the water industry by the American Water Works Association. These standards assure the homeowner that all of the water that he uses will be accurately and fairly measured.

We know, however, that situations do arise in which the homeowner questions the accuracy of the water meter. This may occur when an old, worn meter is replaced by a new meter which more accurately measures water consumption. This higher accuracy level will result in a larger water bill for the homeowner. A leak in the homeowner's plumbing system or unusual usage of water may also result in an abnormally high water bill. In these situations, the homeowner often asks his utility whether his water meter could be running fast or over-registering.

The answer to this question is, "No", - a household type water meter cannot over-register. Perhaps a brief explanation of the construction and operation of a water meter will serve to verify the truth of this statement.

In a household type water meter, the motion of the measuring element, called a piston, is transmitted by a system of gearing to the register which records the flow in convenient units of measurement such as gallons or cubic feet. The register reading is thus dependent on the number of operations of

the piston. The reading is a true measure of usage only when the meter has been properly calibrated. For a new meter, this calibration takes place at the manufacturer's plant and is normally checked by the utility when it receives the meter. For a repaired meter, the utility checks the calibration by running an accuracy test on an accurately calibrated test stand in their meter shop. After proper calibration, the meter will continue to register accurately only so long as the piston continues to make the correct number of cycles for each gallon or cubic foot of water passed through the meter. If any condition should develop whereby the piston is compelled to make other than the required number of cycles per unit of volume, the meter reading will not be accurate. Under ordinary working conditions, a number of factors may cause inaccurate registration, even after a comparatively short interval. However, in every case, these factors will cause the meter to under-register and in no case will the meter be caused to over-register.

Following are the more important of these factors

Excessive Wear – Excessive wear of the moving parts of the meter may be caused by overspeeding because the meter used is too small for the water demand in the home. The results of excessive wear of the measure chamber are slippage and under-registration. Wear causes the clearances between the piston and its housing to increase, allowing water to slip through unmeasured. Excessive wear in the gear train may cause the gears to slip or to bind. In either case, if the meter does not stop entirely, under-registration will result.

Temperature Extremes – Household water meters are not affected by water temperatures up to 80oF. Meters with a slightly larger clearance than usual are used if the water to be measured is consistently warmer than 80o. Excessively high temperatures can cause expansion of the measure piston creating unusual friction or binding in the chamber. The result is slippage and under-registration or a complete stoppage of the meter. High temperature water can be caused by a backup from an improperly installed hot water heater. Quite often the water can be hot enough to cause permanent damage to the internal parts of the meter. Low temperatures have not noticeable effect on the working parts unless the water freezes which will cause damage to the meter. Once again, the meter will either stop completely or will under-register.

Corrosion – All the metals used in the construction of the meter are affected by the corrosive action of water, although the action is very,

very show with most waters. Corrosion will cause excessive clearances to develop in the measure element which will allow water to slip through unmeasured, causing the meter to under-register. It should be recognized that when meters are used in highly aggressive waters, it may be necessary for the water utility to specify special materials such as synthetic polymer measuring chambers which are more resistant to corrosive attack.

Materials in Suspension – Foreign materials carried in suspension in the water have a tendency to fill the space between the piston and the measuring chamber thus affecting registration. All meters are provided with strainers which will retain the larger particles in suspension, but the strainer will soon become clogged if the water is not kept reasonably free from suspended matter. Sand is especially destructive and water utilities take extra care to keep sand from reaching the meter. Any suspended matter will cause a bind between the measuring element and its chamber causing it to slow down, which, once again, will result in under-registration of the meter.

Water utilities are well aware of the problems which occur in their water meters. Maintenance plans are usually followed wherein the water utility will replace a household water meter on a predetermined schedule with one which has been calibrated for accurate measurement. The time interval between replacements should be based on local conditions and the amount of consumption. Normally this time period is between 10 and 15 years.

Your water utility carefully monitors any unusual usage of water. Excessive usage resulting from a leak will normally be brought to the homeowner's attention. Abnormally low usage may be an indication to the utility that the meter in that residence is suffering from one of the problems outlined above and should be replaced with either a new or rebuilt meter.