

CALIBRATION AND PROPER USE OF TEST EQUIPMENT

By Kevin Maine

During our daily routines we rely on many devices for processes, troubleshooting, and data reporting. It is vital we understand how to use and calibrate instruments and interpret their results. It is imperative that we have accurate readings for process control and reporting purposes.

Equipment categories include bench type, remote and portable meters. Common devices may include D.O. (dissolved oxygen) remote and portable, chlorine, pH, temperature, analytical balances, microscopes, color comparators, volt-ohm, and many others.

Calibration versus standardization. Calibration is the comparison of measurement values delivered by a device under test with those calibration standards of known accuracy. The meaning of standardized is to bring into conformity with a standard, especially to assure consistency and regularity or repeatability.

During laboratory classes, we discussed the difference between calibration and standardizing your instruments. We tend to use slang "I calibrated" my meter, which is not always the case. This is especially true when referring to chlorine meters. What's the difference between calibration and standardizing a chlorine meter. During the first use, we fill the cuvette with sample water and press the "zero key" and hope it reads 0. To calibrate the chlorine meter, known standards must be used. Most operations specialists do not have these standards on hand. Additionally, some manufacturers recommend returning the instrument to the factory for calibration. This process applies to many of the instruments we use in our day-to-day operations.

Dissolved oxygen and BOD meters. These instruments have several methods of calibration including altitude or barometric pressure, air saturation at 100%, or Winkler titration. Portable units typically use barometric or altitude to calibrate.

pH meters. Whether benchtop or portable, should be calibrated frequently. Typically, we use what is called a two-point calibration first buffer solution pH 4.0 then pH 10.0 are used and buffer pH 7 is used to verify accuracy. Any deviation from the standards should be recorded and used as a correction factor. Some of the newer meters have no specific order to use the buffer solutions. Be sure to read the manufacturers recommendation!

When using analytical balances, calibration is used with certified weights. The digital balances when in calibration mode specify which weights to use during each calibration session. Again, like the pH meter, any inaccuracies of the weights should be recorded and used as a correction factor. If you are ELAP (Environmental Laboratory Approval Program) certified, you may be required to have a third party verify the calibrations and corrections to be made at the time of inspection.

Color comparators. Color comparators can be difficult to use since we all interpret colors slightly differently. Secondly, be aware that comparators have expiration dates. Typically, these color comparators are used when coliform testing.

Volt ohm multimeters. In some industrial cases, these instruments may be required to be calibrated. However, in our industry it would only be necessary to check the meter against a known voltage or resistance. One recommendation, don't purchase these cheap \$10 meters from the local box store. There are several brands available for less than \$100 that are durable and accurate.

A few final reminders. Always check your instrumentation when first turned on for the day or in between shifts. If these instruments are to be used for reporting purposes, be sure they are EPA compliant. Always refer to the manufacturer's instructions! 💧💧



Kevin Maine
Deputy Director/
Apprenticeship Manager
maine@nyruralwater.org