

Many different kinds of electronic indicators are available for liquid measurement. Gas pumps, vehicle tank meters, and wholesale meters are common applications used. In some cases the same indicator can be used in multiple applications. Below are some guidelines and test procedures to be incorporated into Pub 14 to allow the manufactures to pretest to and to make uniform the testing for the NTEP labs for this technology.

T. Testing required for Electronic Indicators used with Measuring Elements.

If the indicator and measuring element are built into the system as a whole device then they are approved as a system and listed as a single device on the certificate.

If the indicator or measuring element are separable and can be used with other approved and compatible equipment then the following needs to be considered:

If the Electronic Indicator and Measuring Element both have a CC then the two do not need evaluation provided new features that would have a metrological effect have not been added to the existing equipment. Even though they both have a CC they still need compatibility verification i.e. approved and compatible. This can be verified at the local level of compliance.

If neither the Electronic Indicator or Measuring Element do not have a CC then full testing will be performed as per Pub 14 permanence testing for Electronic Indicating Element (20-30 days of significant use) and Measuring Element (through put).

If the Electronic Indicator does not have a CC but the Measuring Element has a CC then the Register will go through the 20-30 day permanence test.

If the Electronic Indicator has a CC but the Measuring Element does not then the measuring element will go through the associated through put as per the permanence for that particular technology.

Upon verification of the local authority, the NTEP lab may allow the local authority to conduct one phase of the evaluation, at the NTEP labs direction and control.

Testing considerations for the electronic indicator:

- 1) Multi-point Calibration: Some of the newer indicators have the optional single point or multi-point calibration. Multi-point calibration associates multiple meter calibration factors with different flow rates. Meter field testing at the local level is usually at the maximum and minimum flow ratings of the meter. Without the ability to print or view the multi-point parameters a meter could be calibrated with an intentional erroneous factor and could go undetected. The only other way would be to test at random flow rates and depending on the number of calibration points fraud could still be undetected; i.e. a meter factor that would allow an out of tolerance error for a delivery flow rate other than customary test flow rates.

Some manufactures have provided a method for weights and measures to view or print the calibration information with out having to break any seals. This viewing or printing capability should be incorporated into Pub 14 (maybe HB44 too?) as a tool for W/M to be able to detect the possibility of fraud on these systems. It would also allow for manufactures to be aware of this and build this into their systems that have multi-point calibration.

- 2) Tests for temperature compensation:
 - a) Temperature test at cold temperature and verify correction.
 - b) Temperature test at hot temperature.
 - c) Temperature test at field site temperature.List temperature range tested and type of probe tested on certificate.
- 3) Tests for pulser/encoder rotation speed:
 - a) Induce pulses and/or frequency at maximum to determine limitations of device.
 - b) Induce pulses and/or frequency at minimum to determine limitations of device.List limitations on certificate.
- 4) Tests for power failure: Indicators are capable of operating on different voltages. May want to consider weighing device testing for electronic indicators and information listed on certificate.
 - a) Test through AC voltage range
 - b) Test through DC voltage range
 - c) Power failure
- 5) Tests for computation, if capable.
 - a) Test below \$.999/gal.
 - b) Test above \$1.00/gal.
 - c) Test above \$2.00/gal.
 - d) Test at maximum unit price capability.
- 6) Tests for agreement of indications between indicator and totalizer if a totalizer is provided.