September 22, 2021

Seraphin Comments on S&T Items Block 5:
CLM-18.2, CDL-18.2, HGM-18.2, and OTH-18.3

These proposals refer to "field reference standard meters," but this term is not currently defined in Handbook 44. The definition proposed in OTH-18.3 is vague. Do "field standard reference meters" have to meet the Fundamental Considerations for field standards? The proposed definition permits any meter to be used as "field reference standard meter" and does not limit the magnitude of the tolerances that may be applied to commercial meters tested with "field reference standard meters." The proposed changes to the tolerance paragraphs in CLM-18.2, CDL-18.2, and HGM-18.2 say that, when "field reference standard meters" are used to test commercial meters, then larger tolerances are to be applied to the meters under test, which means that the "field reference standard meters" do not have to meet the one-third requirement of the Fundamental Considerations.

Weights and measures officials need to know that the field standards and test procedures that they use produce valid test results and are legally defendable. Based on the Fundamental Considerations, the corrections and uncertainties for field standards must not exceed one-third of the tolerance applied to the devices being tested. In most cases, field standards are artifacts whose physical properties are known and corrections can be made when necessary

Handbook 44 recognizes the use of transfer standards in many codes. In some cases, Handbook 44 recognizes that the uncertainties associated with the use of transfer standards exceeds the one-third requirement of the Fundamental Considerations. In these cases, the common practice has been to apply a larger tolerance to the commercial device when transfer standards are used (e.g., belt-conveyor scales, cryogenic meters, carbon dioxide liquid meters, hydrogen gas meters, and farm milk tanks).

Several companies have proposed or supported that mass flow meters (Coriolis meters in particular) and positive displacement meters be used as field standards. Any meter that meets the one-third requirement for a given measurement application may be used as a field standard. **However, it must be proven that the meter meets the one-third requirement over the range of products, environmental conditions (for example, range of air and fuel temperatures, temperature differences and changing temperatures of the air, fuel, and standard during field tests), and operating conditions (for example, the different fuel products measured by the meters, the range of flow rates, the difference pressures of the pumping systems) in which the meter is to be used as a field standard.**

NIST OWM, in cooperation with several states, has undertaken a major project to collect data to evaluate the performance of Coriolis meters in field conditions for the possible use as field standards. OWM expects to develop a template approach that may be used to evaluate other proposed field standards. It would be wrong to recognize Coriolis meters as field standards without having field data that documents and proves that they can meet the requirements as field standards. Without data, weights and measures officials cannot defend the validity of the standards that they use. Weights and measures officials should not recognize meters as field standards without data.

Additional Items that Will Need to be Addressed

1. No data have been submitted to prove that these meters meet the one-third requirements over the range of field conditions to give weights and measures officials the proof that they need that these meters can perform at the level of field standards.

2. If a meter is proven to perform within the one-third requirement, how long will a meter perform within the one-third requirement between calibrations?

3. How do you monitor the performance of dynamic field standards between calibrations?

4. How do you know that each and every meter that is claimed to be a field standard, performs within the one-third requirement?

5. Different makes and models of meters perform differently. How do you know which ones perform at the level of field standards?

6. How do you know that results from meters of the same design, but of different sizes, will agree under field conditions?

7. The laboratory calibration process must reflect the accuracy of the meter over the range of flow rates and operating pressures when used under field conditions.