# National Type Evaluation Technical Committee (NTETC) Measuring Sector Annual Meeting October 5-6, 2012 Louisville, KY

## Meeting Agenda



**Attachments Distributed with Agenda:**

Attachment #1: Draft Checklist for Testing Electronic Digital Indicators with Simulated Pulses [Item 1]
Attachment #2: Draft Measuring Element vs. Register Evaluation Criteria (Technical Policy T) [Item 1]
Attachment #3: Technical Policy C-Product Families Table-Centistoke Correction [Item 9]
Attachment #4: Post-Delivery Discount Revisions-Publication_14_Liquid_Measuring_Devices [Item 10]
Attachment #5: Post-Delivery Discount Revisions-Publication_14_ ECR_Interfaced_with_RMFD [Item 10]
Attachment #6: Bright Solutions Windshield Washer Fluid Vending Device Information [Item 12]

# National Type Evaluation Technical Committee
# Measuring Sector Annual Meeting
# October 5-6, 2012 Louisville, KY

| Glossary of Acronyms | | | |
|---|---|---|---|
| CC | Certificate of Conformance | NTETC | National Type Evaluation Technical Committee |
| DMS | Division of Measurement Standards | OIML | International Organization of Legal Metrology |
| ECR | Electronic Cash Register | OWM | Office of Weights and Measures (NIST) |
| HB 44 | NIST Handbook 44 "Specifications, Tolerances, and Other Technical Requirements for Weighing and Measuring Devices" | PD | Positive Displacement |
| LMD | Liquid Measuring Devices | Pub 14 | NCWM Publication 14 |
| mA | milliamp | RMFD | Retail Motor-Fuel Dispenser |
| NCWM | National Conference on Weights and Measures | SI | International System of Units |
| NIST | National Institute of Standards and Technology | VTM | Vehicle Tank Meter |
| NTEP | National Type Evaluation Program | W&M | Weights and Measures |
| This glossary is meant to assist the reader in the identification of acronyms used in this agenda and does not imply that these terms are used solely to identify these organizations or technical topics. | | | |

## Carry-over Items:

**1. Add Testing Criteria to NTEP Policy U "Evaluating Electronic Indicators Submitted Separate from a Measuring Element"**

**Source:** California NTEP Lab

**Background:** At its 2007 meeting, the Measuring Sector heard that Technical Policy U in Pub 14 allows for testing an indicator separate from a measuring element. However, specific test criteria had not been developed for this practice. The Sector heard a recommendation to develop and add specific criteria for testing an indicator separate from a measuring element.

From 2007 to 2010, the California NTEP laboratory worked to develop a checklist, but had received limited input on the drafts. At the 2009 Sector meeting, Dan Reiswig provided an update to the Sector on progress to develop criteria for separate electronic indicators. He reported that the draft checklist provided to the Sector follows the general format of Pub 14 and the main test procedures are at the end of the document. At the 2010 Sector meeting, Mr. Reiswig presented a list of the areas of the checklist that specifically needed further attention and review. Attachments 1 and 2, submitted by Mr. Reiswig, contain the draft checklist and proposed revisions to Technical Policy T.

**At the conclusion of its 2011 meeting:** the Sector agreed that additional work is needed to finalize the checklist. Mr. Rich Miller (FMC) volunteered to serve as Chair of the Work Group and Sector Technical Advisor, Mr. Marc Buttler (NIST OWM), will assist as needed and monitor progress of work.

Work Group members are listed below:

| Electronic Indicators Checklist Work Group | |
|---|---|
| **Chair:** | Rich Miller, FMC |
| **Members:** | Dmitri Karimov, Liquid Controls |
| | Mike Keilty, Endress and Hauser |
| **Review & Comment:** | Mike Frailer, MD W&M |
| | Allen Katalinic, NC DMS |
| **Technical Advisor:** | Marc Buttler, NIST OWM |
| *Established at the October 21-22, 2011 Measuring Sector Meeting* | |

The Work Group was asked to address the highlighted sections in the draft checklist from Dan Reiswig (Attachment 1) along with the five points below and submit the finished checklist to the two lab representatives listed above for review and comment.

1) A minimum of 10,000 pulses must be collected. To ensure that there will be a change in the displayed indication for each pulse received, the electronic indication should be scaled such that the value of the smallest indicated division should equate to less than or equal to the value associated with one input pulse.
2) It is important to validate whether ±1 pulse is an appropriate tolerance, taking into consideration applicable OIML requirements.
3) The number of different temperature inputs and API gravity values that would need to be tested to adequately verify the temperature compensation function of an electronic indicator must be determined. Spot checking of three random tables at three different temperatures would be adequate to verify an indicator's temperature compensation feature is functioning properly.
4) The Work Group should add a step in the checklist for checking multipoint calibration along with associated guidance. This guidance should emphasize the necessity of working with the manufacturer of each device in order to set up tests to properly check multipoint calibration using simulated pulses.
5) Addressing various different input signal formats including pulses, analog, and digital communication will be challenging. Analog (4-20 mA) input devices are to be excluded from the scope at this time. The Work Group is asked to address pulse (frequency) signals in the final version of the checklist and is asked to consider whether or not to also include digital communications.

***Recommendation:*** The Sector will hear an update on the Work Group's progress and determine the next steps to either further develop or withdraw this proposal.

**2. Product Families Table - Include Water on Existing NTEP CC's**

**Source:** Dmitri Karimov, Liquid Controls

**Background:** Flow meters are approved to very tight tolerances on aggressive liquids such as acids, alcohols, glycols and their mixtures with water and liquid fertilizers. Many of these liquids are water-based such as liquid fertilizers and glycol/water mixtures. Water is a significantly less aggressive fluid and has a higher NIST Handbook 44 tolerance than other liquids.

A note at the end of the Product Families Table in NCWM Publication 14 allows water to be used as a test product in the fuels product family.

Despite the above, NCWM Publication 14 requires separate tests on water in order to add water to the NTEP CC for PD and turbine meters.

**At the conclusion of its 2011 meeting:** The Sector voted on a proposal to add a note to the end of the Product Families Table that would apply to all technologies as follows:

> <u>The water family (in its entirety or partially – as determined by NTEP) can be included on an NTEP CC based on an approved product or range of products with similar metrological characteristics (specific gravity, conductivity, and viscosity - as applicable to the relevant meter technology) unless materials constituting the measuring element are known to deteriorate in contact with water.</u>

The proposal and the results of the vote shown below were forwarded to the NTEP Committee.

| | |
|---|---|
| In favor: | 9 |
| Opposed: | 3 |
| Abstain: | 1 |

**Note:** 2 of the 3 labs were opposed to the item.

On January 21, 2012, the NTEP Committee returned the item to the Sector for further consideration noting that because the majority of the NTEP labs did not concur with the proposal, the conclusion did not represent a consensus among all segments of the membership.

***Recommendation:*** The Sector will consider the proposal to review and identify issues that could be addressed which would move the item toward a consensus conclusion. The Sector will then determine the next steps.

There were several specific concerns raised in the last Sector meeting that should be fully resolved to prepare the item to move forward.

- The proposal to leave open the decision of whether to add water to a CC without additional testing to the judgment of NTEP labs on a case by case basis caused concern among some manufacturers and labs that ambiguity in NTEP policy could lead to inconsistent and less predictable experiences during type evaluation.
- A concern about the application of the LMD Code and the Water Meter Code from HB 44 was raised. Paragraph A.2.(d) of the LMD Code specifically excludes water meters. This exclusion requires a meter that already has a CC on other fluids under the LMD Code to meet the different set of requirements found in the Water Meter Code in order to add water to the CC, specifically the flow rate range requirements defined by meter size in the Notes Section of the Water Meters Code. The Sector may want to consider developing a proposal to amend HB 44 to clarify the exclusion of water meters from the LMD Code.
- Questions were raised about the burden that testing with water imposes. Several manufacturers stated that they often test on water and did not understand why it was viewed as an unreasonable burden.
- There were concerns raised that water has been grouped separately in the product families table in the past for a reason, and that different types of water can affect measuring devices differently. It was proposed that the product families table could be revised, but a specific proposal has not been developed to date.
- A concern that the word "similar" in the proposed language needed to be defined in more detail was raised. This could also potentially be addressed by developing a more detailed proposal to revise the product families table.

### 3. Product Families Table – Change Test Requirements for Turbine Meters from Test A to Test E

**Source:** Dmitri Karimov, Liquid Controls

**Background:** In the Product Families table of NCWM Publication 14, turbine meters require testing on individual products with some exceptions. This approach, which was appropriate many years ago when turbine meters were first entering the custody transfer arena, has become outdated. Turbine meters have been tested extensively under NTEP. Turbine meters need to at least have product tests match those of PD meters because turbine meter influence factors are similar to those of PD meters.

**At the conclusion of its 2011 meeting:** The Sector agreed to carry this item over to the Sector's 2012 meeting to allow time for Mr. Karimov to prepare a detailed proposal using the format of the current Product Families Table.

As of August 10, 2012, Mr. Karimov has suggested that the item be withdrawn until such time as a detailed proposal can be completed.

***Recommendation:*** The Sector is asked to withdraw this item from its agenda until such time as a detailed proposal for test criteria is submitted.

### 4. Product Families Table – Consolidate Product Categories for PD and Turbine Meters

**Source:** Dmitri Karimov, Liquid Controls

**Background:** NCWM Publication 14 (Pub 14) has too many agri-chemical products categories for PD and turbine meters that were created many years ago and are outdated. This item also relates to the parallel proposal to match PD and turbine product categories.

**At the conclusion of its 2011 meeting:** The Sector voted on the alternative proposal developed at the 2011Sector meeting to add a note to the LMD Technical Policy, which was modified to include the qualifiers "PD or turbine" and "model" as shown below.

> If a PD or turbine meter is approved for a product of low viscosity in one product family or category and the same model meter is approved for a product of high viscosity in another product family or category, the meter will be approved for this viscosity range in both product families/categories.

The proposal and the results of the vote shown below were forwarded to the NTEP Committee.

| | |
|---|---|
| Approve: | 7 |
| Oppose: | 5 |
| Abstain: | 0 |

**Note:** All 3 labs and NIST were opposed to the item as it was framed for the vote.

On January 21, 2012, the NTEP Committee returned the item to the Sector for further consideration noting that because the NTEP labs and NIST did not concur with the proposal, the conclusion did not represent a consensus among all segments of the membership.

***Recommendation:*** The Sector will consider the proposal and identify issues that could be addressed which would move the item toward a consensus conclusion. The Sector will then determine the next steps and either further develop or withdraw this proposal.

There were several specific concerns raised in the last Sector meeting that should be fully resolved to prepare the item to move forward.

- There was a concern that there was no data available to support the proposal.
- The effect of the proposal on permanence testing requirements was not fully understood.
- A concern was stated that the proposal would not ensure that an appropriate amount of testing is done to understand the effects of flow profile, viscosity, and other fluid flow characteristics over the full range of meter sizes within a family.
- The labs stated a concern with manufacturers being made fully responsible for compatibility between all variations in product and meter materials.

## New Items:

### 5. Pictograms for "Setup or Configuration Mode Enabled"

**Source:** NTEP Measuring Labs

**Background:** At the spring 2012 meeting of the NTEP measuring labs, the labs agreed that pictograms (e.g.,  ) are clear and acceptable as indications of the status of the setup or configuration mode while sealing a device. To clarify acceptability of pictograms, it is proposed that an example be added to the table of examples under the heading of Acceptable Clear Indications.

**Recommendation:** Add a pictogram to the sealing checklist table under examples of Acceptable Clear Indications that a device has the setup or configuration mode enabled as shown in the lower left corner of the figure below.

| **Indications representing that the device is configured with the setup or configuration mode enabled (i.e., any mode permitting access to any or all sealable parameters)**<br>This list is not limiting or all-inclusive; other indications may be acceptable. | |
|---|---|
| **Acceptable Clear Indications** | **Indications NOT Acceptably Clear** |
| Unusable quantity indications<br>Example:<br>C100.05E | C 100.05 gal |
| "not **HB 44**" annunciator | Any digit in the quantity differentiated by size, shape, or color |
| "CAL" annunciator<br>(single or mixed case) | Quantities w/o units<br>Example.<br>100.05 |
| "Set-up" annunciator<br>(single or mixed case) | Flashing quantity value |
| "Config" annunciator<br>(single or mixed case) | Quantity with no annunciators displayed |
|  | Quantity all annunciators displayed |

It is also recommended that the Sector consider adding an accompanying checklist table to show examples of optional indications that a device is in the sealed mode or has setup or configuration mode disabled. Indication of this mode is currently neither required nor prohibited in HB 44.

| **Indications (optional) representing that the device is configured with the setup or configuration mode disabled (i.e., no access to any or all sealable parameters)**<br>This list is not limiting or all-inclusive; other indications may be acceptable. |
|---|
| **Acceptable Clear Indications** |
|  |

**6. Utility Water Meter Repeatability Tolerances**

**Source:** NTEP Measuring Labs

**Background:** The new Section L "Laboratory Evaluation and Permanence Tests for Utility Type Water Meters" that was added to Pub 14 in 2012 includes repeatability tolerance values for utility-type meters. At the spring 2012 meeting of the NTEP measuring labs, the labs recommended that these tolerance values should be removed from Pub 14. Tolerance values are published in HB 44, and it is standard practice to refer to HB 44 as the sole location of all tolerance values.

**Recommendation:** Remove the tolerance values for utility-type water meters from Pub 14 as shown below.

## L. Laboratory Evaluation and Permanence Tests for Utility Type Water Meters

All new-design meters are subject to a permanence test. NTEP reserves the right to require a permanence test based on the results of the initial examination.

**Initial Examination**

1. All meters of the new type installed at the type evaluation location are subject to evaluation. At least three meters of the same model must be tested.
2. At least three meters will be chosen for throughput testing on water. The minimum number of tests to be conducted for each of these meters will include the following:
    - Three tests at the maximum flow rate
    - Three tests at the intermediate flow rate
    - Three tests at the minimum flow rate
3. All meters must perform within acceptance tolerance.
4. Repeatability - When multiple tests are conducted at approximately the same flow rate, each test shall be within the applicable tolerances and the range of test results shall not exceed repeatability tolerance. ~~the following values:~~
    1. ~~0.6 percent for tests conducted at Normal Flow Rates~~
    2. ~~2.0 percent for tests conducted at Intermediate Flow Rates~~
    3. ~~4.0 percent for tests conducted at Minimum Flow Rates~~

**Subsequent Examination**

1. Following the period of use, the tests listed above are to be repeated. All results within the range of flow rates are to be included on the certificate of conformance provided the results are within the applicable tolerances.
2. The examination will be conducted as applicable:
    - 200,000 gallons for throughput testing for mechanical changes of metrological significance
    - Flow rates during throughput testing are not to exceed 50% of the manufacturers rated maximum flow rate
3. Three tests at maximum, intermediate and minimum flow rate will be made on the throughput meters. Only one test at each flow rate needs to be performed on any remaining meters.
4. Repeatability – When multiple tests are conducted at approximately the same flow rate, each test shall be within the applicable tolerances and the range of test results shall not exceed repeatability tolerance. ~~the following values:~~
    1. ~~0.6 percent for tests conducted at Normal Flow Rates~~
    2. ~~2.0 percent for tests conducted at Intermediate Flow Rates~~
    3. ~~4.0 percent for tests conducted at Minimum Flow Rates~~

**7. Water Meters Permanence Flow Rates**

**Source:** NTEP Measuring Labs

**Background:** The new Section L "Laboratory Evaluation and Permanence Tests for Utility Type Water Meters" that was added to Pub 14 in 2012 includes a restriction preventing throughput flow rates to 50% of maximum rated flow rate and below. The NTEP labs report that past laboratory throughput testing of water meters has been run with flow rates near the maximum rated flow rate. Water meters in service are often found that are nearly continuously subjected to flow at close to the maximum rated flow rate. The labs feel it is important to be able to conduct testing under the conditions in which the meters will be used.

**Recommendation:** Remove the restriction in Section L that prevents throughput flow rates above 50% of maximum rated flow rate as shown below.

**Subsequent Examination**

1. Following the period of use, the tests listed above are to be repeated. All results within the range of flow rates are to be included on the certificate of conformance provided the results are within the applicable tolerances.
2. The examination will be conducted as applicable:
   - 200,000 gallons for throughput testing for mechanical changes of metrological significance
   - ~~Flow rates during throughput testing are not to exceed 50% of the manufacturers rated maximum flow rate~~
3. Three tests at maximum, intermediate and minimum flow rate will be made on the throughput meters. Only one test at each flow rate needs to be performed on any remaining meters.
4. Repeatability – When multiple tests are conducted at approximately the same flow rate, each test shall be within the applicable tolerances and the range of test results shall not exceed repeatability tolerance.

**8. Clarify Scope of Technical Policy R (VTM and Stationary) - Applicability to both Meters and Registers**

**Source:** Steve Cook, NIST

**Background:** At their April 2000 meeting, the NTEP Laboratories agreed that if a meter is successfully tested in a vehicle-mounted application, the resulting CC could cover both vehicle-mounted and stationary applications without additional testing in a stationary application. The Labs forwarded a proposal to the Measuring Sector to add a new paragraph to the Technical Policy for Liquid-Measuring Devices, and this resulted in the addition of Technical Policy R "Vehicle-Mounted and Stationary Applications of the Meter" into Pub 14.

Since it was originally developed, Technical Policy R has referred only to "the meter." NIST has received inquiries from industry requesting clarification on whether the scope of Technical Policy R is intended to include registers. Discussion notes from the 2000 Measuring Sector meeting confirm that the proposal was originally based on recognition that the vehicle-mounted application is the worst case of the two scenarios. There is no mention of any intention to exclude registers from the scope of this conclusion.

**Recommendation:** Clarify Technical Policy R to include registers within the scope as shown below.

## R. Vehicle-Mounted and Stationary Applications of ~~the~~ Meters and Registers

If a meter or register is successfully tested in a vehicle-mounted application, both vehicle-mounted and stationary applications can be covered on the resulting NTEP Certificate of Conformance (CC) without additional testing in a stationary application provided all other suitability criteria have been met (e.g. flow rates.) If a meter or register evaluation has only been conducted in a stationary application, testing must also be conducted on the meter or register in a vehicle-mounted application in order to cover both applications on the NTEP CC.

**9. Correct the Units for the Turbine Meter's Critical Parameter of Kinematic Viscosity to Centistokes (cSt) in the Product Families Table**

**Source:** Marc Buttler, NIST

**Background:** In 2010, the Measuring Sector recommended a new format to reorganize the Product Families Table of Technical Policy C. The NTEP Committee approved the new format of the table and it was published in the 2011 edition of Publication 14.

The Sector had been working to develop the new format since 2006. The Sector agreed upon a scope for the project that was limited to revising the format and not the content of the Product Families Table in the NTEP Technical Policy C. The Sector considered multiple iterations of the table and various formats with the goal of providing NTEP laboratories and manufacturers with guidelines that would improve the clarity and consistency of application of product family criteria. See the 2006 – 2010 Measuring Sector Meeting Summaries for details.

The way in which viscosity units were presented in the older format of the table led to an error in how the content was translated to the new format. Viscosity units for both PD and turbine meters had previously been combined in the old format in a single column labeled "Viscosity (Centipoise Centistokes). The correct unit for the critical parameter of "kinematic viscosity" that applies to turbine meters is centistokes (cSt). The correct unit for the critical parameter of "viscosity" (dynamic or absolute) that applies to PD meters is centipoise (cP).

The relationship between centistokes and centipoise is shown in the following equations:

$$\text{centistokes } (10^{-6}\ m^2/s) = \text{centipoise } (10^{-3}\ kg/m{\cdot}s) \div \text{density } (kg/m^3)$$

OR

$$\text{centistokes (cSt)} = 1.002 \times \text{centipoise (cP)} \div \text{density (SG)}$$

The identification of kinematic viscosity as the correct critical parameter for turbine meters can be verified by referring to the description of Test E from the table, which has always been reserved exclusively for turbine meters.

> **Test E**
> To cover a range of products within each product category, test with one product having a low **kinematic viscosity** and test with a second product having a high **kinematic viscosity** within each category. The Certificate of Conformance will cover all products in the product category within the **kinematic viscosity** range tested.

Furthermore, kinematic viscosity is identified in active turbine meter CCs by using units of centistokes as the critical parameter to define the approved range of kinematic viscosity for the device type.

**Recommendation:** Correct the unit labeling of all references to kinematic viscosity under the turbine meter columns of the Product Families Table in Technical Policy C to centistokes (cSt) as shown in the example below. A complete markup with all changes to the table is included as Attachment 3. In addition to the corrections of the unit labels, the markup also includes updated kinematic viscosity values for each product that were computed from the dynamic viscosity and density values found for each product elsewhere throughout the table. The conversions between units of centipoise and centistokes in Footnote 1 of the table are also clarified in the Attachment 3 markup.

| **Turbine Flow Meter<br>Product Category and Test Requirements** | |
|---|---|
| **Test E**<br>To cover a range of products within each product category, test with one product having a low kinematic viscosity and test with a second product having a high kinematic viscosity within each category. The Certificate of Conformance will cover all products in the product category within the kinematic viscosity range tested.[1] | |
| **Product Category:**<br>Alcohols, Glycols and Water Mixes Thereof (Alc Gly) | |
| **Typical Products** | **Reference Kinematic Viscosity[1]<br>(60 °F) ~~Centipoise (cP)~~ Centistokes (cSt)** |

**10. Post-Delivery Discounts and Electronic Receipts**

**Source:** 2012 NCWM S&T Committee Item 330-1 (Unit Price Posting and Selection Requirements)

**Background:** At the 2012 NCWM, S&T Item 330-1 was approved to update specifications in HB 44 to address current marketing methods for offering pricing discounts beyond simple cash/credit pricing and to establish a framework for "post-delivery" discounts offered after the delivery of fuel is complete.

The Sector will be asked to consider specific changes to Pub 14 to reflect the changes adopted by the NCWM. These changes will be presented to the Sector prior to the meeting.

**Recommendation:** Update the LMD and ECR-RMFD checklists to reflect the new requirements relating to post-delivery discounts and availability of electronic receipts. Complete markups are included as Attachment 4 (LMD checklist) and Attachment 5 (ECR-RMFD checklist).

**11. NCWM Pub 14, NTEP Administrative Policy Revision**

**Source:** NTEP

**Background:** NCWM is working to revise Pub 14, Administrative Policy to put it in a more logical order and more understandable form. The purpose is not to change the intent of the Pub, rather to realign and clarify sections as necessary.

**Recommendation:** Sectors, committees and the NTEP labs are asked to review the revised section, "NTEP Administrative Policy" and provide feedback. An electronic copy of the document will be distributed by NCWM to all that submit a registration form to attend the Sector meeting.

## Additional Items as Time Allows:

The Measuring Sector received two agenda item requests from industry on Sept. 5, 2012. Both items are developing and the submitters would appreciate input from the Measuring Sector on the changes to Pub 14 and HB 44 that would be necessary to address the issues raised.

Additionally, the NCWM S&T Committee would appreciate input from the Measuring Sector on the measuring-related issue on its agenda that is outlined in Item 14 below.

If time permits, the Measuring Sector is asked for comments on these issues. In the interest of brevity, the narrative for Item 14 is abbreviated to the extent practical. A full description of Item 14 can be found in the S&T Committee's list of carryover items and its 2012 Interim Report. A copy of any regional association modifications or positions will be provided to the Sector when these are made available by the regions.

**12. Windshield Washer Fluid Vending Units**

**Source:** Chris Willeke, Bright Solutions

**Purpose:** Clarify testing and evaluation requirements for windshield washer fluid vending units. A vending unit for this application manufactured by Bright Solutions uses components similar to those that are used in water vending equipment. Washer fluid is typically 60% to 99% water depending on the season and location. It typically uses alcohol as an anti-freezing agent in the solution. Additional information regarding the Bright Solutions device has been provided by Bright Solutions in Attachment #6.

**Item Under Consideration:** This is a new developing measuring-related item that was submitted to the Sector for preliminary guidance. Specific language for Pub 14 and HB 44 have not yet been developed.

Paragraph A.1. in HB 44 Section 3.36 "Water Meters" describes the intended application of the Water Meter Code as follows:

> **A.1. General**. – This code applies to devices used for the measurement of water; generally applicable to, but not limited to, utilities type meters installed in residences or business establishments and meters installed in batching systems.

Since windshield washer fluid is not water, but rather a water-based solution, HB 44 Section 3.30. for LMDs would normally apply instead of the Water Meter Code. Dispensers for other water-based solutions (e.g., Diesel Exhaust Fluid) and fuel additives have previously been submitted for NTEP CCs and evaluated using the LMD Code.

Both the Water Meter Code and the LMD Code require primary elements that indicate the quantity delivered.

The Water Meter Code (3.36.) states:

> **S.1.1.1. General.** – A water meter shall be equipped with a primary indicating element and may also be equipped with a primary recording element. Such elements shall be visible at the point of measurement or be stored in non-volatile and nonresettable memory. The display may be remotely located provided it is readily accessible to the customer.
> (Amended 2002)
>
> **S.1.1.2. Units.** – A water meter shall indicate and record, if the device is equipped to record, its deliveries in terms of liters, gallons or cubic feet or binary or decimal subdivisions thereof except batch plant meters, which shall indicate deliveries in terms of liters, gallons or decimal subdivisions of the liter or gallon only.

The LMD Code (3.30) states:

> **S.1.1. General.** – A liquid-measuring device:

(a) shall be equipped with a primary indicating element; and

(b) may be equipped with a primary recording element.

**S.1.2. Units.** – A liquid-measuring device shall indicate, and record if the device is equipped to record, its deliveries in liters, gallons, quarts, pints, fluid ounces, or binary-submultiples or decimal subdivisions of the liter or gallon.
(Amended 1987, 1994, and 2006)

The Bright Solutions device does not indicate the measured quantity delivered to the customer. It vends selected preset discrete quantities (e.g., 1 gallon). The device will continue to dispense product until it reaches the preset quantity or until the customer controlled nozzle remains shut for a length of time exceeding a predetermined time-out. If the time-out period elapses before the preset quantity is delivered, the remaining amount of what was purchased is retained in storage and the device is reset for the next transaction without issuing credit to the customer for any undelivered amount. There are currently no provisions in either HB 44 or Pub 14 for devices that dispense fluid products without an indication of the measured amount.

The submitter suggests that similar devices are in service now in some jurisdictions to vend water. The main difference between these devices and the proposed method is that water vending machines are designed to always deliver the full quantity of what was purchased into an empty container of known volume. Because water vending machines always dispense the full amount that was purchased, the selected preset amount can serve as the indication of the quantity that was delivered. Water vending machines have no customer controlled nozzle, so there is no need for a time-out function that resets the transaction, possibly retaining an undisclosed amount of undelivered product. No standards or test methods exist in HB 44 or Pub 14 that could be employed to ensure that the time-out function is operating as intended and not in a way that could facilitate fraud.

**Recommendation:** The Sector is asked to consider the application and recommend the most appropriate path to address the following issues for windshield washer fluid vending devices:

- Determine the appropriate code section from HB 44 that applies to this application and whether any changes or additions to either HB 44 and/or Pub 14 are required.
- Determine what changes or additions to either HB 44 and/or Pub 14 are appropriate to recognize the proposed method of dispensing without an indication of the total quantity delivered and with a time-out function. The submitter suggests using language that can be found in the California Type Evaluation Program (CTEP) standards for testing and certifying water vending units as a starting point, but these standards would not address specifications or testing of the time-out function.

**13. Hot Water Meters**

**Source:** Michael Dick, Norgas Metering Technologies, Inc.

**Purpose:** Include provisions for type evaluation and NTEP certification of hot water meters (water meters operating in the range from 80 °F to 140 °F). Submeter applications exist where individual tenants share a common water heating system. To accommodate accurate measurement of the hot water consumed by each tenant, NTEP certified meters capable of measuring the water after it has been heated are needed.

**Item Under Consideration:** This is a new developing measuring-related item that was submitted to the Sector for preliminary guidance. Specific language for Pub 14 and HB 44 have not yet been developed.

**Recommendation:** Neither Pub 14 nor HB 44 specifically address water temperature in the sections related to water meters. The Sector is asked to consider whether specific testing requirements or other information are needed in Pub 14 and/or HB 44 to support NTEP evaluation, testing, and certification of hot water meters that are designed to operate continuously in the range from 80 °F to 140°F.

**14. Section 3.31. Vehicle-Tank Meters; Paragraph T.4. Product Depletion Test *(S&T Carryover Agenda Item)***

**Source:** Northeast Weights and Measures Association (NEWMA). This item originally appeared as "Part 3, Item 1 Vehicle-Tank Meters: T.4. Product Depletion Test" in the 2009 NCWM Interim Report 360-2: Developing Items.

**Purpose:** Modify the VTM code to base the product depletion test tolerances on the meter's maximum flow rate (a required marking on all meters), rather than the meter size (a required marking for meters manufactured beginning in 2009). This will enable more consistent application of the tolerances for older meters, which are not required to be marked with the meter size, and address an unintentional gap which allows an unreasonably large tolerance for smaller meters.

**Item Under Consideration:**
The Committee is considering the following modifications to VTM Code paragraph T.4. and the accompanying Table T.4. Note that this option was identified as "Option 2" in the Committee's 2011 Final Report and 2012 Interim Agenda.

**T.4. Product Depletion Test.** – The difference between the test result for any normal test and the product depletion test shall not exceed **0.5 % percent of the volume delivered in one minute at the maximum flow rate marked on the meter for meters rated higher than 380 Lpm (100 gpm) or 0.6 % percent of the volume delivered in one minute at the maximum flow rate marked on the meter for meters rated 380 Lpm (100 gpm) or lower.** ~~**tolerance shown in Table T.4.**~~ Test drafts shall be of the same size and run at approximately the same flow rate.

[Note: The result of the product depletion test may fall outside of the applicable test tolerance as specified in Table 1.]

**Delete current Table T.4**

~~**Table T.4.**~~

~~**Tolerances for Vehicle-Tank Meters on Product Depletion Tests, Except Milk Meters**~~

| ~~Meters Size~~ | ~~Maintenance and Acceptance Tolerances~~ |
|---|---|
| ~~Up to, but not including, 50 mm (2 in)~~ | ~~1.70 L (104 in$^3$)[1]~~ |
| ~~From 50 mm (2 in) up to, but not including, 75 mm (3 in)~~ | ~~2.25 L (137 in$^3$)[1]~~ |
| ~~75 mm (3 in) or larger~~ | ~~3.75 L (229 in$^3$)[1]~~ |
| ~~Based on a test volume of at least the amount specified in N.3. Test Drafts.~~ | |

**Background / Discussion:**
This item was submitted to NEWMA at its 2008 Interim Meeting to propose an alternative to the current tolerances for the product depletion test. The current tolerances are applied based on the size of the meter; the alternatives presented by the original submitter propose basing the tolerances on a percentage of maximum flow rate rather than meter size. The submitter noted that, while a nonretroactive marking requirement added in 2008 eliminates difficulties in determining meter size for newer metering systems, inspectors are still faced with difficulties consistently determining meter size for older systems, and these systems will likely remain in service for many years. Additionally, the submitter noted that the original proposal to base the tolerance on meter size did not consider the possibility of smaller meters (e.g., down to ¼ in) being mounted on vehicles. Applying the current tolerance to these smaller meters based on the meter size would result in a 22.5% relative error for one minute of flow during a product depletion test. Even a slightly larger, 1-inch meter would have a relative error of 2.25%. These tolerances seem inappropriately large. While the submitter noted that 2-inch and 3-inch meters are expected to comprise the largest number of vehicle-mounted meters, the current tolerances based on meter size provide an inappropriately large tolerance for smaller meters.

The Committee has agreed with the concept of basing the product depletion test tolerances on the marked maximum flow rate of the meter rather than on the marked meter size and has considered several proposals for modifying the tolerances since this item was introduced in 2008. Details of these proposals and associated discussion can be found

in the Committee's 2009-2011 final reports. While recognizing that one goal of the original proposal was to reduce what the submitter considered an unreasonably large tolerance for smaller meters, the Committee expressed concern about the impact on these meters based on comments from Meter Manufacturers Association, including comments during the 2011 NCWM Annual Meeting.

From 2009 to 2011, the Committee repeatedly requested data to support or oppose the proposals under consideration with little success. At the 2011 Annual Meeting, the committee reiterated its need for data to evaluate the impact of any proposed tolerances changes. Following the meeting, NIST Technical Advisor, Ms. Tina Butcher, on behalf of the Committee, distributed a request on NIST, OWMs Director's list serve asking weights and measures jurisdictions to submit data.

At the 2012 NCWM Interim Meeting, the Committee reiterated its position that tolerances for the product depletion test of a VTM should be based on the Marked Maximum Flow Rate of the meter rather than meter size. The Committee considered the three options for modifying NIST Handbook 44, including two options presented in its Interim Agenda and a third option submitted by the MMA prior to the meeting. A summary of the three options is outlined in the following table. A second table illustrating examples of tolerances for common meter sizes and maximum flow rates is also included.

| **Summary of Product Depletion Tolerance Options Considered** | | |
|---|---|---|
| | **Marked Maximum Flow Rate or Meter Size** | **Tolerance (% of Marked Max Flow Rate)** |
| **Current** | Up to but not including 2" | 104 $in^3$ |
| | 2" up to but not including 3" | 137 $in^3$ |
| | 3" and larger | 229 $in^3$ |
| **Option 1:** | All Maximum Flow Rates | 0.5% |
| **Option 2:** | Marked Max ≤ 100 gpm | 0.6% |
| | Marked Max > 100 gpm | 0.5% |
| **Option 3:** | Marked Max ≤ 60 gpm | 0.8% |
| | Marked Max > 60 gpm up to and including 100 gpm | 0.6% |
| | Marked Max > 100 gpm | 0.5% |

| **Examples of Tolerance Options for Different Meter Sizes/Flow Rates** | | | | | |
|---|---|---|---|---|---|
| **Size** | **Marked Maximum Flow Rate (gpm)** | **Current Tolerance** | **Option 1 (0.5% max)** | **Option 2 (0.6% max) (0.5% max)** | **Option 3 (0.8% max) (0.6% max) (0.5% max)** |
| 1-1/2″ | 60 gpm | 104 $in^3$ | 69 $in^3$ | 83 $in^3$ | 111 $in^3$ |
| 2″ | 100 gpm | 137 $in^3$ | 115 $in^3$ | 139 $in^3$ | 139 $in^3$ |
| 2″ | 150 gpm | 137 $in^3$ | 173 $in^3$ | 173 $in^3$ | 173 $in^3$ |
| 3″ | 150 gpm | 229 $in^3$ | 173 $in^3$ | 173 $in^3$ | 173 $in^3$ |
| 3″ | 200 gpm | 229 $in^3$ | 231 $in^3$ | 231 $in^3$ | 231 $in^3$ |
| 3″ | 300 gpm | 229 $in^3$ | 346 $in^3$ | 346 $in^3$ | 346 $in^3$ |
| 3″ | 350 gpm | 229 $in^3$ | 404 $in^3$ | 404 $in^3$ | 404 $in^3$ |

During its Open Hearings at the 2012 Interim Meeting, the Committee heard support for Option 3 from members of the MMA. The Committee also heard comment from Ross Andersen, who submitted the original proposal. Mr. Andersen pointed out that the tolerances in option 1 were the same as those that apply prior to modifying the tolerance to be based on meter size.

S&T Technical Advisor, Mrs. Tina Butcher, NIST OWM, reported that the Committee received product depletion test data from nine state and county weights and measures jurisdictions. Mrs. Butcher distributed a summary to the Committee as shown in the following two tables. Mrs. Butcher noted that assumptions were made about meter size in some instances where meter size and/or maximum flow rate were not both provided. The first table summarizes the number of meters tested along with a comparison of the number that failed the current and proposed tolerances; the data includes a breakdown of meters in three different flow rate categories.

**Summary of Product Depletion Test Data**
**Submitted by State and County Weights and Measures Jurisdictions**
**As of 1/20/12**

| | Total Meters | Failed Current Tolerance | Failed Option 1 | Failed Option 2 | Failed MMA | Marked Max |
|---|---|---|---|---|---|---|
| **Jurisdiction #1** | 67 | 0 | 2 | 1 | 1 | --- |
| | 1 | 0 | 1 | 1 | 1 | 60 gpm |
| | 53 | 0 | 1 | 0 | 0 | 100 gpm |
| | 12 | 0 | 0 | 0 | 0 | >100 gpm |
| | 1 | 0 | 0 | 0 | 0 | ?? |
| | | | | | | |
| **Jurisdiction #2** | 9 | 0 | 0 | 0 | 0 | No Data |
| | | | | | | |
| **Jurisdiction #3** | 288 | 21 | 33 | 22 | 20 | --- |
| | 28 | 1 | 5 | 3 | 1 | 60 gpm |
| | 228 | 17 | 25 | 16 | 16 | 100 gpm |
| | 32 | 3 | 3 | 3 | 3 | >100 gpm |
| | | | | | | |
| **Jurisdiction #4** | 196 | 7 | 18 | 9 | 6 | --- |
| | 14 | 0 | 3 | 3 | 0 | 60 gpm |
| | 153 | 5 | 14 | 5 | 5 | 100 gpm |
| | 29 | 2 | 1 | 1 | 1 | >100 gpm |
| | | | | | | |
| **Jurisdiction #5** | 134 | 7 | 12 | 7 | 7 | --- |
| | 10 | 2 | 3 | 2 | 2 | 60 gpm |
| | 72 | 4 | 8 | 4 | 4 | 100 gpm |
| | 52 | 1 | 1 | 1 | 1 | >100 gpm |
| | | | | | | |
| **Jurisdiction #6** | 200 | 20 | 29 | 20 | 20 | --- |
| | 0 | 0 | 0 | 0 | 0 | 60 gpm |
| | 178 | 16 | 25 | 16 | 16 | 100 gpm |
| | 22 | 4 | 4 | 4 | 4 | >100 gpm |
| | | | | | | |
| | | | | | | |
| **Jurisdiction #7** | 196 | 13 | 14 | 13 | 13 | --- |
| | 0 | 0 | 0 | 0 | 0 | 60 gpm |
| | 150 | 11 | 12 | 11 | 11 | 100 gpm |
| | 46 | 2 | 2 | 2 | 2 | >100 gpm |
| | | | | | | |
| **Jurisdiction #8** | 761 | 0 | 7 | 1 | 0 | --- |
| | 103 | 0 | 1 | 1 | 0 | 60 gpm |
| | 629 | 0 | 6 | 0 | 0 | 100 gpm |
| | 29 | 0 | 0 | 0 | 0 | >100 gpm |
| | | | | | | |
| **Jurisdiction #9** | 71 | 26 | 26 | 20 | 20 | No Data |

The second table provides a summary showing these totals for all jurisdictions combined.

| | Total Meters | Failed Current Tolerance | Failed Option 1 | Failed Option 2 | Failed Option 3 | Marked Max |
|---|---|---|---|---|---|---|
| **Summary of All Jurisdictions** | 156 | 3 | 13 | 10 | 4 | **60 gpm** |
| | 1463 | 53 | 91 | 52 | 52 | **100 gpm** |
| | 222 | 12 | 11 | 11 | 11 | **>100 gpm** |
| | 81 | 26 | 26 | 20 | 20 | **No Info** |
| **Totals** | **1922** | **94** | **141** | **93** | **87** | |

At the 2012 NCWM Annual Meeting Open Hearings, Mr. Dmitri Karimov, Liquid Controls, speaking on behalf of the Meter Manufacturers Association, commented that, while MMA is aware that the Committee did not support MMA's proposed "Option 3," the MMA supports "Option 2" recommended by the Committee.

The Committee wishes to express its sincere appreciation to those jurisdictions that submitted data. The Committee discussed the data received and the summaries prepared by NIST OWM. The Committee recognizes that the data collected was not obtained under controlled conditions or as part of a structured survey or study; however, the data has been extremely valuable to the Committee in assessing the relative impact of the three options proposed. After discussing the comments and reviewing the summary of the data prepared by NIST OWM, the Committee agreed that option 2 represents a reasonable compromise between the original proposal and the MMA's proposal (designated Option 3 in the tables above). The Committee acknowledged that this item has included multiple proposals up to this point and it is important for the Committee to designate a single option for consideration by the NCWM in order that this item can progress. Consequently, the Committee is deleting the other options and presenting Option 2 for consideration. Because this item has included multiple proposals up to this point, the Committee decided to designate this item as an Information item and is asking for input on the proposal as shown in the Item Under Consideration prior to moving the item forward as a Voting item.

**Recommendation to the Measuring Sector:** The Committee asks the Regional Weights and Measures Associations and industry for input regarding whether or not the proposed changes are ready for adoption in the next NCWM cycle.