

**National Type Evaluation Technical Committee  
Measuring Sector Annual Meeting  
October 2-3, 2009 Clearwater, FL**

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**Attachments Distributed with Agenda:**

- Attachment #1: Proposed Revisions to Policy C – Product Family Table, from Mike Keilty (Agenda Item 1)
- Attachment #2: Draft Checklist for Testing Electronic Digital Indicators with Simulated Pulses (Agenda Item 4)
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# National Type Evaluation Technical Committee Measuring Sector Annual Meeting October 2-3, 2009 Clearwater, FL

## Meeting Agenda

### Carry-over Items:

#### 1. Table of Key Characteristics of Products in Product Families for Meters Table

**Source:** Carryover Item – 2007 and 2008 Measuring Sector Agenda

**Background:** At its 2006 annual meeting, the Sector established a small work group tasked with developing proposed changes to the Product Families for Meters table in NCWM Publication 14 to help improve consistent application and ease of use of the table. In 2007, the Sector heard a progress report from the work group and considered a number of proposed revisions (see the 2007 meeting summary for details). The work group also noted additional work was needed to list the various liquids, describing their viscosity, specific gravity, and conductance.

At its 2008 meeting, the Sector was asked to consider another proposal from the work group, consisting of (1) a proposed table listing product families/groups along with typical product names and corresponding viscosities and specific gravities; and (2) a proposed revision to the product families table outlining test requirements for different meter types within each product family. The Sector also discussed the categorization of Liquid CO<sub>2</sub> and the inclusion of milk and dairy products under separate agenda items.

After considerable review and discussion and on-screen editing of proposed variations of the table, the Sector reached a consensus on the format of the table, agreeing to divide the information into three tables: Table C.1. Tests to be Conducted (identifying tests to be conducted); Table C.2. Product Family Table (outlining product families broken down by meter technology and referencing tests from Table C.1.); and Table C.3. Typical Product Family Characteristics (listing typical products in each product family and the viscosity and specific gravity of each). At the end of the meeting, there was general agreement that the proposed revisions represent major improvements, while acknowledging that additional work was needed as outlined below:

#### Summary of Key Changes Made or Needed:

- The original table in Pub 14 includes a viscosity range for Fungicides; however, there is no value listed in the new table for Fungicides. Until specific values can be included, these are to be identified as Crop Chemical 1, 2, 3, and 4.
- “Flowables” is missing from the table.
- Consider putting crop chemicals after water and other changes to make the table flow better.
- The order of the tables originally numbered C1 and C2 was reversed for better flow.
- The note for a single test to cover NH<sub>3</sub> and LPG should also apply to turbine meters. The original table did not specify that the note applied to PD meters only. (*Note: This was a point of contention that was not resolved during the meeting, as referenced earlier.*)
- The terms in Table C2 and Table C3 (original numbers) should match for the various product families.
- The term for “centipoise” needs to be consistent.
- The term “centistokes” was deleted from the headers.
- The footnotes from the original product families table were pulled back into table C2 (original number).
- Though “juices and beverages” is referenced in the current product family, it was not included in the new Table C.3. The Sector agreed that “juice and beverages” can be added to the “water/milk” category for other meter technologies.

The following “maintenance” issues requiring further work and development were also identified:

**Maintenance Issues:**

- Start to combine the “crop chemicals” into a single category. Update product names to reference currently available products.
- For magnetic flow meters we talk about beverages. It needs to be referenced for other technologies.
- There is no reference to heated products below 50 degrees C.
- If you list the items in order from lowest to highest viscosity, it would make the table easier to follow. By viscosity? By Specific gravity? Alphabetically by name?
- Need to include references to the footnotes included in Table C1.
- Other food products such as corn syrup are not presently referenced in the table.

At the conclusion of the meeting, the Sector once again agreed that a consensus had been reached on the general revisions to the format, but that additional content changes are needed. The Sector recognized the amount of work put into developing the revised format and identifying corrections needed to improve consistent application of the criteria. Sector members present expressed a reluctance to wait an entire year to implement these corrections. Some members noted that ballots on more complicated topics have been successfully distributed in the past and suggested that changes identified at the meeting be made and the Sector balloted. The Sector agreed that “maintenance issues” can be addressed at a future point following additional research and discussion.

Mike Keilty and Dmitri Karimov agreed to take on the task of following up on these changes and prepared a ballot, which was distributed to the Sector prior to the NCWM Interim Meeting. The results of the vote (8 affirmative, 6 negative, and 4 abstain) indicated a lack of consensus to support these additional changes. Consequently, while the Sector supported the revised format, there was not support for the additional changes without further review and discussion.

Note that, under 2008 Agenda Item 7, the Sector agreed on the following:

- Add milk to the “water” product categories in the table. However, because of the issue of conductivity, for magnetic flow meters where there are two categories for water, add milk to the “tap water” category.
- A manufacturer can select a field site for either a water meter application or a milk meter application and have both products covered on the Certificate. If the site selected is a site intended to meter milk, then milk must be used for the test liquid.

**Recommendation:** Based upon comments received and additional research on product characteristics, Sector Chairman Mike Keilty has developed a revised version of the three tables for consideration by the Sector as shown in *Attachment #1* to this Agenda. The Sector is asked to review the latest draft and consider it for inclusion in the next edition of NCWM Publication 14.

## **2. NTEP Checklist for Hydrocarbon Gas Vapor Meters in Sub-metering Applications**

**Source:** NTEP Director

**Background:** At its 2006 meeting, the Measuring Sector was asked by the NTEP Committee to consider and develop a checklist for residential hydrocarbon gas vapor meters. These devices will most likely be used for submetering. At that meeting, the Sector heard that several states had recently contacted NTEP regarding these devices. California already has evaluation and certification of these devices in their state. The Sector was asked to review the procedures used by California (which were included as Appendix D of the 2006 meeting agenda) and rework them into a format acceptable for NCWM Publication 14. The Sector agreed at that time that the best approach for developing a Publication 14 checklist for LPG vapor meters would be the utilization of a WG made up of technical experts and other interested parties. Dan Reiswig, California NTEP Laboratory, was to provide a list of vapor meter manufacturers to be contacted for participation in the WG.

At the time of development of the 2007 meeting agenda no information had been received from the WG. At the meeting, the Sector reviewed a recommendation and considered changes to Publication 14 deemed appropriate. After reviewing a draft presented by the California NTEP laboratory, the Sector agreed that “LPG” in the title should be changed to “Hydrocarbon Gas” so that the measurement of natural gas would be included. The California NTEP laboratory and the NTEP director were to continue to develop this checklist for presentation and discussion at the next Sector meeting.

At its 2008 meeting, the Sector, at the suggestion of the NTEP Measuring Laboratories, raised the question of whether or not there is interest in developing this checklist. The CA laboratory representatives noted that they receive only one or two requests per year for this type of evaluation. Dan Reiswig noted that, while feedback on a draft checklist was positive, manufacturers commenting indicating having no products affected by the checklist. Jim Truex also questioned whether it is necessary for NTEP to address these devices given the small number of devices submitted for evaluation in the past and the fact that states may be willing to accept California's Certificate of Approval in lieu of an NTEP CC.

There was little discussion of the proposed checklist among Sector members during the meeting. Mike Keilty suggested that, because of the limited interest, the Sector should consider removing the item from its agenda as a carryover item if no progress to finalize a checklist is made within the next year.

Dan Reiswig indicated that the bulk of the remaining work is in reformatting the checklist to fit within the Publication 14 structure and stated the CA laboratory could look at this over the next year. Jim Truex reported that he received an e-mail from Maurice Van Puten, PhD, whose company manufactures a digital hydrocarbon vapor meter recently approved by CA and MA and who offered his help.

The Sector agreed that the CA NTEP Laboratory will work to reformat the checklist into a Publication 14 format. Norma Ingram (CA) agreed to coordinate with Maurice Van Puten and Jim Truex to work on this issue between now and the next Sector meeting.

**Recommendation:** The Sector will hear an update on the progress on this issue.

### 3. Testing Meters Made of Different Materials

**Source:** California NTEP Laboratory – Carryover from 2007 Measuring Sector Agenda

**Background:** The Sector reviewed this issue at its 2007 and 2008 meetings, but was unable to reach a consensus on the item. The Meter Manufacturers had also prepared a white paper in which they noted that it is the manufacturer's responsibility to ensure that a meter meets type, noting the long history of meter compliance and also that NIST Handbook 44 is not intended to differentiate between measurement technologies, only the intended application. They also pointed out questions to be answered in order to make an informed decision on this issue include: (1) Is there a real world problem that requires a solution by inclusion of a new section in NCWM Publication 14 specifically aimed at materials?; and (2) Is there an inequity in the market or facilitation of fraud?

At its 2008 meeting, the Sector had extensive discussion over specific examples of meter sizes, product applications, and component materials. There were clearly divided opinions regarding how these combinations should be addressed. Manufacturers generally seemed to feel that component materials relative to the intended meter application are a design issue and should be left to the manufacturer to address, particularly since they will ultimately be responsible for ensuring that the meters work accurately and their customers are satisfied. Some NTEP laboratory representatives were comfortable with the idea of allowing the marketplace to take care of this issue, whereas others were not, particularly citing their feeling of responsibility in attesting to the accuracy of what is listed on a CC. However, it was clear that all laboratories felt the need for additional guidance in how to handle variations with regard to the amount of testing required and on how to handle listing materials information on the CC to ensure consistency among all of the laboratories.

The Sector was unable to reach any consensus on this issue; however, the Sector acknowledged that the issue is not going to be eliminated from the Sector's agenda. Criteria (whatever that may be) regarding how to address materials must be included in Publication 14, and guidance needs to be given to the NTEP Laboratories to ensure this issue is consistently addressed for all evaluations.

**Recommendation:** The Sector is asked to reconsider this issue and attempt to reach a resolution. The original proposal first considered at the Sector's 2006 meeting is included for reference along with an excerpt of the discussion from the most recent (2008) Sector discussion of this item.

**Original Proposal from 2006 Sector Meeting:**

The following proposal was offered as a possible solution. The Sector reviewed the proposal for possible forwarding to the NTEP Committee for inclusion in Publication 14.

**Proposal:** Add a new Section F. to the Publication 14 Technical Policy as follows and renumber subsequent sections:

**U. Meters Made of Different Materials within the Same Family**

**When multiple meters made of different materials within a meter family are submitted for evaluation all meters will be tested with at least one product from each product family to be included on the CC and at least one meter will be tested with the range of products required in the Product Family Table for the meter type (e.g., positive displacement, turbine, mass meter, etc.) submitted for evaluation.**

**Excerpt from Item 3 of the 2008 Measuring Sector Final Meeting Summary:**

**Discussion:** Steve Patoray described (from his perspective as past NTEP Director) the scenario discussed at the 2006 and 2007 Sector meeting. He noted that materials used in devices are considered metrologically significant for weighing applications and questions were raised about whether or not materials are metrologically significant for metering applications. Some had suggested that using criteria similar to that used by Underwriters Laboratories might be considered. He indicated that many were uncomfortable with the concept of defining a “worst case” scenario for particular materials. He further noted that the question was raised of where to stop in the examination of device components: the body of the meter, or the seals, or other location? Manufacturers indicate that these questions are all part of the design process and inherent with assembling a device intended for a given application. Steve concluded his overview by noting that a key question is whether or not additional testing is needed based on variations in the materials used in the metering system and further commented that it is not likely that a field official will be able to determine these differences by visual examination. The inspector just needs to have confidence that the meter they are examining is covered by the CC. An overriding concern of NTEP is to ensure that the evaluation is fair and that the requirements are being applied consistently to all manufacturers. At present, NTEP has no guidance on how to handle these different scenarios.

Allen Katalinic (NC) commented that while changes to significant components of a meter will make a difference, there are many parts in a meter where changes will not have any metrological impact. Mike Frailer (MD) noted that a key difficulty on the part of the evaluator is in assessing how to consistently assess whether a given change is metrologically significant, and Jim Truex noted that this depends on how one defines “metrologically significant.” Paul Glowacki commented that Jim’s point touches on the basic issue, which is how to define what changes can be made without reevaluation. A manufacturer may be confident that a change in material will not affect a meter’s performance; however, an evaluator may not agree and may require re-evaluation. There have to be some guidelines because, at present, Paul feels as if every CC is a negotiation and what is applied to one company may be different than what is applied to another company. Tina Butcher commented that the technical policies in Publication 14 strive to minimize the amount of testing required for a manufacturer to list the maximum number of devices on a CC. She stated that, for the NTEP laboratories, key questions are: (1) whether the laboratories and NTEP management have adequate information to enable them to assess when additional testing is needed in order to list particular variations on the CC, and (2) how they can make that assessment consistently from manufacturer to manufacturer and from laboratory to laboratory. NTEP has developed experience with some basic types of changes to devices through trial and error and in consulting with manufacturers; the laboratories are asking for specific guidelines with regard to materials variation. Mike Keilty noted that manufacturers submit a sample(s) of a device in good faith and expect a rigorous evaluation; however, manufacturers are concerned that the amount of testing not be expanded beyond what is economically feasible.

Relaying discussions from the NTEP laboratory meeting prior to the Sector meeting, Jim Truex commented that the laboratories also have a dilemma in assessing how to avoid “horror stories” such as experiences with E85 while establishing reasonable guidelines. Jerry Butler (NC) also noted that, while many manufacturers such as those who have long participated in NTEP Sector meetings and evaluations are conscientious and laboratories may trust their judgment, laboratories are seeing an influx of equipment from sources (sometimes off shore) with which they have had little experience and whose manufacturers sometimes have little if any experience with legal metrology

requirements, let alone U.S. requirements. This concern was echoed by other laboratories who also noted confidence in manufacturers participating in this discussion, but recognized that policies must be in place to ensure fair treatment. Several manufacturers commented that the industry will take care of substandard products produced by competitors by bringing such instances to NTEP's attention; reputable manufacturers cannot afford to allow substandard products to undercut the market when they themselves are expending the resources needed to comply.

The Sector also had some discussions about replacement parts and how these affect metrological integrity, with some members noting that field officials are unable to determine when non-metrologically equivalent or inferior components are used by visual examination. Several members commented that this is not something that can be prevented by increased evaluation at the type evaluation level, but is rather addressed by performance testing in initial and subsequent verification. In addition, the manufacturer is equally concerned about unauthorized substitutions since this can affect the reputation of their product. In that same vein, a manufacturer would not make a change in materials unless he is confident that the change would not affect the performance of the device in his customer's application. Rodney Cooper (Actaris) pointed out that reputable manufacturers police themselves to ensure their customer's continued confidence. Norm Ingram pointed out that manufacturers have designed these products and know from experience what will work, so perhaps the best approach is to allow them to make these changes and allow the marketplace to take care of itself. Norm did note, however, as did Dan Reising (CA), that even if the issue is tabled, the laboratories still need guidance on how to consistently approach proposed changes with regard to issuing CCs.

Dmitri Karimov and others pointed out that NTEP has largely relied on the integrity of the manufacturer in reporting changes to devices and that, in many cases, NTEP or a field official would never be able to tell the difference. For example, if a rotor is changed, there is no reasonable way that weights and measures officials can determine that the clearances are different. In addition, NTEP has also relied primarily on the manufacturer to provide guidance on when a particular change is metrologically significant. With regard to material, the manufacturer's concern is in making sure that the materials are compatible with the product being measured in the application. Mike Keilty questioned how conformity assessment might factor into this issue and contribute to resolving some of these questions.

Rich Tucker echoed an earlier comment by Norm Ingram, noting that most manufacturers change materials because of the products with which the meter will be used. When a manufacturer finds through experience that a particular change creates problems, manufacturers make adjustments accordingly to ensure continued performance. Rich even noted there were instances when NTEP passed a material in an evaluation and that material later proved to be problematic. The majority of the time materials issues will resolve themselves and most of the testing requirements imposed by the product families table are going to address any question about materials.

The Sector also discussed numerous examples of specific materials and their effect on metering of different product types; however, these discussions provided no insight on how to best address the materials issue. Steve Patoray reminded the Sector that its purpose is to advise the NTEP administrator, and Publication 14 will only be changed if the NTEP Committee agrees with the Sector's recommendations.

Will Wotthlie (MD) commented that the laboratories are putting their reputation on the line by issuing a CC and saying that it covers everything listed on the CC; the laboratories want to have confidence that the devices will work and field officials are, in turn, relying on that assurance. Will also questioned why NTEP is needed if the feeling is that everything in the field will take care of itself. Mike Keilty noted that a balance needs to be achieved between a system that can be practically executed and one that will still provide confidence; manufacturers are concerned about expanding testing beyond what is economically feasible.

Will Wotthlie suggested that an alternative is for the labs to simply list what is tested on the CC under the testing conditions section; however, some manufacturers indicated they want to continue to list materials of construction on the CC under the "Standard Features and Options" section. Jim Truex noted that a CC is not meant to be a marketing tool. Tina Butcher commented that, in its early days, NTEP decided that only metrologically significant things should be listed on the CC. If this position is to be maintained, then the Sector needs to decide whether or not to include the metals on the CC if all options are covered. If the Sector concludes that the material is not significant, then perhaps a statement needs to be included in publication 14 to that effect. She also reminded the Sector that the laboratories are not only trying to assess whether or not a new variation in material can be covered on the CC, but also how to determine which of two meters to select for testing when they are made of different

materials.

Some members, including NTEP laboratory representatives as well as manufacturers, stated that if the materials feature or attribute is not metrologically significant, it doesn't belong on the CC; the information can be listed in the test conditions, but not on the front of the CC under the "Standard Features and Options." Dmitri Karimov questioned why the information would be listed in the test conditions if it isn't metrologically significant. Others noted that this record may eliminate the need for additional testing should policies change at a later date. Jim Truex also pointed out that if the information is to be listed on the front of the CC, it will be necessary for the laboratory to determine the "worst case" scenario with regard to materials.

At present there is a great variation among existing CCs with regard to how materials are referenced. Steve Patoray noted that there are differences in how manufacturers request this information be reflected on their CCs; some want various model numbers listed, including different materials. Some believe that the only thing that should be listed on the CC is the product application for which the meter is approved, not the materials. Jerry Butler questioned why the manufacturers want to list all of these different products on the CC, commenting that it is up to the manufacturer and the customer to make sure the meter is right for the application. He further noted it would be helpful to have materials construction identified through the model designation.

Questions were raised by the manufacturers and laboratories about how CCs will be handled until the Sector can reach an agreement with regard to testing requirements for materials variations. Jim Truex reiterated that the purpose of a CC is not a marketing tool. Jim indicated that, as NTEP Director, he is not comfortable with listing all these different features unless the laboratory has tested them. Without taking a position on whether or not "materials" are considered a metrologically significant feature, Jim indicated that, for consistency purposes, NTEP will not list materials in the standard features and options; however, the information will be listed in the test conditions for the meter(s) tested during the NTEP evaluation(s). He noted this will be an administrative decision to ensure consistency. In response to a question about whether eliminating the reference to materials of construction in the "standard features and options" section would affect existing CCs that presently list this information, Jim stated that no changes would be made until the CC is being revised for other reasons.

After extensive debate on the first day of the meeting without resolution, the Sector returned to the discussion the following day with little additional progress. At that point, Mike Keilty noted that there are manufacturers who have product materials listed on their CCs and those who do not have the materials listed. He commented that, in establishing guidelines, the Sector has tended to draw a broad brush across metering technologies and, in many instances, treated them as the same even though people know they are not made the same way. Manufacturers generally make the materials of the meter to be compatible with the product to be measured and manufacturers may take different approaches in ensuring this compatibility. Andre Noel (Neptune) pointed out that some meters are made of different materials for different product applications, and the change in product necessitates an additional evaluation. Andre noted that a manufacturer can't make a meter out of bronze, for example, and use it to meter a caustic material because it will fail. Manufacturers take the product application and other application details into account when designing and choosing a meter for a given application based and will relay this information to the customer with regard to where the meter can be used. Andre further noted that this becomes a question of liability for the manufacturer since the customer will hold the manufacturer accountable. Some members also made note that the materials may be more significant for some meter technologies than for others.

The NTEP laboratories are asking for guidance to ensure consistency, but the Sector seems to be at an impasse with regard to how to provide that guidance. The Sector was not able to agree upon a general guidance that would assist the laboratories in understanding material construction and its impact on device performance. The laboratories need to be comfortable that the testing they have conducted supports the variations listed on the CC. Dennis Beattie (Measurement Canada) observed that the issue seems to focus on the question of how the materials affect the definition of what constitutes a "family" of devices. He also pointed out in response to an example of a manufacturer choosing a lighter material for a vehicle-mounted than a stationary application that some materials such as aluminum respond differently to changes in temperature.

#### **4. 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 MS heard that Section U. of the NTEP Policy in NCWM Publication 14 allows for testing an indicator separate from a measuring element. However, specific test criteria had not been developed for this section. The Sector heard a recommendation to develop and add specific criteria for testing an indicator separate from a measuring element for this section. The California NTEP Laboratory recommended using Canada's test criteria as a guideline to develop the tests outlined in that meeting agenda's Appendices A, B, and C.

The Sector agreed the California NTEP laboratory should lead a WG to develop a specific test procedure for review at the next Sector meeting. Members of the WG selected at the 2007 meeting are Dave Rajala (Veeder-Root Company), Rich Miller (FMC Technologies), Maurice Forkert (Tuthill Transfer Systems), Dmitri Karimov (Liquid Controls), Rodney Cooper (Actaris Neptune), and Ralph Richter (NIST WMD).

At the 2008 Sector meeting, Dan Reiswig reported that he had developed and circulated an initial draft of criteria for separate indicators. He emphasized that indicator manufacturers and people on work group have provided a lot of help on the development of test criteria for these indicators thus far, particularly Rich Miller and Dmitri Karimov. Dan reported that the work group has also been fortunate to be able to consult with Canada's type evaluation laboratory staff, noting that the Canadian document for evaluating these devices is written more for people who regularly work in the lab and continually works with electronics. The Sector had some discussion on this issue, particularly regarding the scope and focus of the proposed checklist. See the 2008 Sector Meeting Summary for details.

At the conclusion of the discussion, Mike Keilty asked for a renewed commitment from the people who have volunteered for the work group and asked if others are interested in participating. The work group was to meet briefly at the conclusion of the 2008 Sector meeting and will begin working via e-mail and telephone calls. The work group established a goal of having an updated draft by the beginning of January 2009. Work Group members who are able to attend the NCWM Interim Meeting and the Annual Meeting can meet to work further on the draft. Dennis Beattie and Mike Keilty volunteered to join the work group. Sector Technical Advisor Tina Butcher asked to be copied on any correspondence so that she is kept abreast of the status of the work.

**Recommendation:** The Sector will hear an update on the progress of this work from the Work Group. A copy of the draft criteria to date is included in *Attachment #2* to this agenda.

#### **New Items:**

#### **5. Policy C - Product Family Table – Change in Upper Limit for Oxygenated Blends – Note 4**

**Source:** Gordon Johnson, Gilbarco, Inc.

**Recommendation:** The Sector is asked to review NCWM Publication 14, Technical Policy C. Product families for meters, Note 4 in the product families table, which currently states:

**"Gasoline includes oxygenated fuel blends with up to 15% oxygenate"**

(Note: This footnote appears in Table C.2. Product Family Test Table in the revised version of the Tables currently under consideration by the Sector in Agenda Item 1.)

The Sector is asked to consider changing the oxygenated fuel blends from 15% to 25%. The new note 4 would read:

**"Gasoline includes oxygenated fuel blends with up to 25% oxygenate"**

**Problem/Justification:** UL recently issued UL87A Edition 5. This standard details the tests and specifications needed to list dispensers for Ethanol and Ethanol blends. The 5th edition specifies 3 major gasoline fuel categories:

- a) Gasoline for Use as Automotive Spark-Ignition Engine Fuel, ANSI/ASTM D4806 (Up to E10)- (Current)
- b) Gasoline/ethanol blends with nominal ethanol concentrations up to 25 percent ethanol (E25) (NEW)
- c) Gasoline/ethanol blends with nominal ethanol concentrations above 25 percent (E85) (Current)

When EPA set the new ethanol limits "standard gasoline" will include more ethanol. This affects all gasoline motor fuel dispensers currently in use. Typically we see the need to re-calibrate a meter when adding ethanol. The ethanol acts as a solvent washing away gasoline varnish and the meter may shift its calibration point.

The following additional information regarding the fifth issue of UL's Outline Subject 87A is provided for the Sector's reference:

UL SUBJECT 87A  
OUTLINE OF INVESTIGATION FOR POWER-OPERATED DISPENSING DEVICES FOR GASOLINE AND GASOLINE/ETHANOL BLENDS WITH NOMINAL ETHANOL CONCENTRATIONS UP TO 85 PERCENT (E0 – E85)  
Issue Number: 5 AUGUST 10, 2009

Summary of Topics

This Fifth issue of Outline Subject 87A contains requirements pertaining to a new rating option. This new option will include an E25 rating along with the original E85 rating. This addition will allow for products to carry the lower rating when they are not intended for use with higher blends of gasoline/ethanol. New requirements have been added for blending options in dispensers. This required a new test, the Blending Cycling Test, which addresses the cycling of ethanol blends inherent in this type of use. Various editorial changes have also been included to address testing with one sample rather than two when evaluating for the E25 rating and other editorial changes have been made for clarification.

## 6. Electronic Linearization for Positive Displacement Meters

Source: Maurice Forkert, Tuthill Transfer Systems

**Recommendation:** The Sector is asked to add criteria into NCWM Publication 14 for electronic linearization for positive displacement meters. Maurice Forkert suggests considering Measurement Canada's "Approval Procedure for Linearization Functions Incorporated in Measuring Systems" (Document Number VO-AP-037) as the basis for the criteria, provided there is no objection by Measurement Canada or copyright violation by doing so.

Maurice suggested the following revisions to the Measurement Canada document:

- **Section 1.2. Scope**

Add paragraph to the "Scope" of the document as shown below. This paragraph would bring electronic output PD meters, turbine meters, etc. that do not have a shaft output on equal requirements as other meters that currently incorporate electronics in the measuring device.

### 1.2 Scope

This procedure applies to pulse processing electronic devices incorporating the linearization of the pulse per unit volume versus pulse frequency. This includes all flow computers, electronic registers, correction devices and supporting software external to the measuring device. The tests verify the proper functioning and accuracy of the linearization schemes.

For processing electronic devices incorporating the linearization of the pulse per unit that is within the measuring device, the results of the device accuracy and endurance tests will verify the complete measuring

device capabilities. The linearization electronics of the measuring device must be protected from tampering and fraud utilizing a physical seal. No separate tests on parts of the measuring device are required.

- **2.1. Equipment Requirements.**

This section needs to be reviewed by the work group developing criteria for electronics. When Tuthill tested their linearization board in Canada, they had problems because their Dual Channel Pulser “off” position of the pulse did not go close enough to zero volts. Tuthill furnished a dual channel pulser that goes down to within 0.2 volts in the “off” part of the pulse and then the Measurement Canada counters worked fine.

- **Section 2.5.1. and 2.5.3.**

The word “devices” should be “EUT.”

- **Section 2.6.2.1. and 2.6.2.3.**

Do not limit “meter Factors” to 4 or 5 points. See proposed revisions to 2.6.2.5. below as a method to test all points for which the device is capable.

- **Section 2.6.2.5.**

Delete runs number 2 through number 5 and replace with:

2. Select frequencies that result in flow rates that lie between each pair of points programmed in Section 2.6.2.3. Test at each frequency.

Change Run number 6 to number 3.

- **Factor Limit**

The limit of 3 to 5 factors should be changed to cover any number of factors.

A copy of Maurice’s letter proposing this addition along with his suggested changes and the Measurement Canada document is included in *Attachment #3* to this Agenda.

**Problem/Justification:** There apparently is no regulation for electronic linearization internal to a positive displacement meter.

## 7. Next Meeting

**Recommendation:** The Sector is asked to develop a proposed date and location for the next meeting.

## **Additional Items as Time Allows:**

The NCWM S&T Committee would appreciate input from the Measuring Sector on the following measuring-related issues on its agenda. If time permits, the Measuring Sector is asked for comments on these issues. In the interest of brevity, the narrative for each item is abbreviated. Full descriptions of the items can be found in the S&T Committee’s list of carryover items and its 2009 Interim Report. A copy of the full carryover items will be provided to the Sector when these are made available to the regions.

## 8. G-S.1. Marking (Software)

The S&T Committee is considering changes to G-S.1. to better address software-based systems. The Committee has considered multiple proposals under this item.

The proposed changes originally considered by the Committee were as follows:

Amend G-S.1. and G-S.1.1. as follows:

**G-S.1. Identification. – For the purposes of identification, all equipment, except weights and separate parts necessary to the measurement process but not having any metrological effect and manufactured on or after January 1, 201X, shall be clearly marked as specified in Table G-S.1. Identification and explained in the accompanying notes in Table G-S.1. Notes:**

All equipment, except weights and separate parts necessary to the measurement process but not having any metrological effect **and manufactured prior to January 1, 201X**, shall be clearly and permanently marked for the purposes of identification with the following information:

(a) the name, initials, or trademark of the manufacturer or distributor;

(b) a model identifier that positively identifies the pattern or design of the device;

*(1) The model identifier shall be prefaced by the word “Model,” “Type,” or “Pattern.” These terms may be followed by the word “Number” or an abbreviation of that word. The abbreviation for the word “Number” shall, as a minimum, begin with the letter “N” (e.g., No or No.). The abbreviation for the word “Model” shall be “Mod” or “Mod.” Prefix lettering may be initial capitals, all capitals, or all lowercase.*

*[Nonretroactive as of January 1, 2003]*

*(Added 2000) (Amended 2001)*

(c) a nonrepetitive serial number, except for equipment with no moving or electronic component parts and **Type U (not-built-for-purpose) software-based devices**;

*[Nonretroactive as of January 1, 1968]*

*(Amended 2003 **and 201X**)*

*(1) The serial number shall be prefaced by words, an abbreviation, or a symbol, that clearly identifies the number as the required serial number.*

*[Nonretroactive as of January 1, 1986]*

*(2) Abbreviations for the word “Serial” shall, as a minimum, begin with the letter “S,” and abbreviations for the word “Number” shall, as a minimum, begin with the letter “N” (e.g., S/N, SN, Ser. No., and S. No.).*

*[Nonretroactive as of January 1, 2001]*

(d) the current software version or revision identifier for **Type U (not-built-for-purpose) software-based devices**;

*[Nonretroactive as of January 1, 2004]*

*(Added 2003) (**Amended 201X**)*

*(1) The version or revision identifier shall be prefaced by words, an abbreviation, or a symbol, that clearly identifies the number as the required version or revision.*

*[Nonretroactive as of January 1, 2007]*

*(Added 2006)*

*(2) Abbreviations for the word “Version” shall, as a minimum, begin with the letter “V” and may be followed by the word “Number.” Abbreviations for the word “Revision” shall, as a minimum, begin with the letter “R” and may be followed by the word “Number.” The abbreviation for the word “Number” shall, as a minimum, begin with the letter “N” (e.g., No or No.).*

*[Nonretroactive as of January 1, 2007]*

*(Added 2006)*

- (e) *an NTEP Certificate of Conformance (CC) number or a corresponding CC Addendum Number for devices that have a CC. The CC Number or a corresponding CC Addendum Number shall be prefaced by the terms “NTEP CC,” “CC,” or “Approval.” These terms may be followed by the word “Number” or an abbreviation of that word. The abbreviation for the word “Number” shall, as a minimum, begin with the letter “N” (e.g., No or No.)*  
[Nonretroactive as of January 1, 2003]

The required information shall be so located that it is readily observable without the necessity of the disassembly of a part requiring the use of any means separate from the device.

(Amended 1985, 1991, 1999, 2000, 2001, 2003, ~~and~~, 2006, **and 201X**)

*G-S.1.1. Location of Marking Information for Type U (Not-Built-For-Purpose), Software-Based Devices. – For Type U ~~not built for purpose, software-based~~ devices manufactured prior to January 1, 201X, either:*

- (a) *The required information in G-S.1. Identification. (a), (b), (d), and (e) shall be permanently marked or continuously displayed on the device; or*
- (b) *The Certificate of Conformance (CC) Number shall be:*
- (1) *permanently marked on the device;*
  - (2) *continuously displayed; or*
  - (3) *accessible through an easily recognized menu and, if necessary, a submenu. Examples of menu and submenu identification include, but are not limited to, “Help,” “System Identification,” “G-S.1. Identification,” or “Weights and Measures Identification.”*

**Note:** *For (b), clear instructions for accessing the information required in G-S.1.(a), (b), and (d) shall be listed on the CC, including information necessary to identify that the software in the device is the same type that was evaluated.*

[Nonretroactive as of January 1, 2004]

(Added 2003) (Amended 2006 **and 201X**)

<b>Table G-S.1. Identification for Devices Manufactured on or after January 1, 201X (For applicable notes, see Table G-S.1. Notes on Identification)</b>			
<b><u>Required Marking</u></b>	<b><u>Full Mechanical Devices and Separable Mechanical Elements</u></b>	<b><u>Type P Electronic Devices and Separable Elements</u></b>	<b><u>Type U Electronic Devices and Separable Elements</u></b>
<b><u>Name, initials, or trademark of the manufacturer or CC holder</u></b>	<b><u>Hard-Marked</u></b>	<b><u>Hard-Marked or Continuously Displayed</u></b>	<b><u>Hard-Marked, Continuously Displayed, or Via Menu (display) or Print Option (8)</u></b>
<b><u>Model identification information that positively identifies the pattern or design of the device (1)</u></b>	<b><u>Hard-Marked</u></b>	<b><u>Hard-Marked or Continuously Displayed</u></b>	<b><u>Hard-Marked, Continuously Displayed, or Via Menu (display) or Print Option (8)</u></b>
<b><u>Non-repetitive serial number (2)</u></b>	<b><u>Hard-Marked</u></b>	<b><u>Hard-Marked or Continuously Displayed</u></b>	<b><u>Not Acceptable</u></b>
<b><u>Software version or revision (3)</u></b>	<b><u>Not Applicable</u></b>	<b><u>Hard Marked (5), Continuously Displayed, or by Command (operator action) (6)</u></b>	<b><u>Continuously Displayed or Via Menu (display) or Print Option (8)</u></b>

<u>Certificate of Conformance number or corresponding CC Addendum (4)</u>	<u>Hard-Marked</u>	<u>Hard-Marked or Continuously Displayed</u>	<u>Hard-Marked (7) or Continuously Displayed</u>
<p><u>The required information shall be so located that it is readily observable without the necessity of the disassembly of a part requiring the use of any means separate from the device.</u></p>			
<p><u>(Added 201X)</u></p>			
<p align="center"><u>Table G-S.1. Notes on Identification For Devices Manufactured on or after January 1, 201X</u></p>			
<ol style="list-style-type: none"> <li>1) <u>The model identifier shall be prefaced by the word “Model,” “Type,” or “Pattern.” These terms may be followed by the word “Number” or an abbreviation of that word.</u> <ul style="list-style-type: none"> <li>- <u>The abbreviation for the word “Number” shall, as a minimum, begin with the letter “N” (e.g., No or No.).</u></li> <li>- <u>The abbreviation for the word “Model” shall be “Mod” or “Mod.” Prefix lettering may be initial capitals, all capitals, or all lowercase.</u></li> </ul> </li> <li>2) <u>Except for equipment with no moving or electronic parts, the serial number shall be prefaced by words, an abbreviation, or a symbol, that clearly identifies the number as the required serial number.</u> <ul style="list-style-type: none"> <li>- <u>Abbreviations for the word “Serial” shall, as a minimum, begin with the letter “S,” and abbreviations for the word “Number” shall, as a minimum, begin with the letter “N” (e.g., S/N, SN, Ser. No., and S. No.).</u></li> </ul> </li> <li>3) <u>Metrologically significant software shall be clearly identified with the software version. The identification may consist of more than one part but one part shall be dedicated to the metrologically significant portion.</u> <ul style="list-style-type: none"> <li>- <u>The version or revision identifier shall be prefaced by words, an abbreviation, or a symbol, that clearly identifies the number as the required version or revision.</u></li> <li>- <u>Abbreviations for the word “Version” shall, as a minimum, begin with the letter “V” and may be followed by the word “Number.”</u></li> <li>- <u>Abbreviations for the word “Revision” shall, as a minimum, begin with the letter “R” and may be followed by the word “Number.”</u></li> <li>- <u>The abbreviation for the word “Number” shall, as a minimum, begin with the letter “N” (e.g., No or No.).</u></li> </ul> </li> <li>4) <u>An NTEP Certificate of Conformance (CC) number or a corresponding CC Addendum Number for devices that have a CC. The CC Number or a corresponding CC Addendum Number shall be prefaced by the terms “NTEP CC,” “CC,” or “Approval.”</u> <ul style="list-style-type: none"> <li>- <u>These terms may be followed by the word “Number” or an abbreviation of that word.</u></li> <li>- <u>The abbreviation for the word “Number” shall, as a minimum, begin with the letter “N” (e.g., No or No.).</u></li> </ul> </li> <li>5) <u>If the manufacturer declares that the primary sensing element “software” is integral, has no end user interface and no print capability, the version/revision shall be hard-marked on the device. Example: Primary sensing element may be Positive Displacement (P.D.) meter with integral correction, digital load cell (only for reference, not limiting).</u></li> <li>6) <u>Information on how to obtain the Version/Revision shall be included on the NTEP CC.</u></li> <li>7) <u>Hard-marking of the CC Number is permitted if no means of displaying this information is available.</u></li> <li>8) <u>Information on how to obtain the name, initials, or trademark of the manufacturer or CC holder, model designation, and software version/revision information shall be included on the NTEP CC.</u></li> </ol>			
<p><u>(Added 201X)</u></p>			

More recently, the NTETC Software Sector proposed the following simplified alternative for the Committee to consider:

<b><u>Table G-S.1. Identification for Devices Manufactured on or after January 1, 201X</u></b>		
<b><u>Required Marking</u></b>	<b><u>Full Mechanical Devices and Separable Mechanical Elements</u></b>	<b><u>Electronic Devices, Software Based</u></b>
<b><u>Manufacturer or CC holder ID</u></b>	<b><u>Hard Marked</u></b>	<b><u>Hard Marked, Continuously Displayed, or Via Menu (display) or by command or operator action</u></b>
<b><u>Model identification</u></b>	<b><u>Hard Marked</u></b>	<b><u>Hard Marked, Continuously Displayed, or Via Menu (display) or by command (operator action)</u></b>
<b><u>Serial number</u></b>	<b><u>Hard Marked</u></b>	<b><u>Hard Marked, Continuously Displayed<sup>1</sup></u></b>
<b><u>Metrologically Significant Software version</u></b>	<b><u>Not Applicable</u></b>	<b><u>Continuously Displayed, Via Menu (display) or by command (operator action)<sup>2</sup></u></b>
<b><u>Certificate of Conformance number</u></b>	<b><u>Hard Marked</u></b>	<b><u>Hard Marked or Continuously Displayed, or Via Menu (display) or by command (operator action)<sup>3</sup></u></b>
<p><sup>1</sup><b><u>Type ‘U’ devices need not have a non-repetitive serial number.</u></b></p> <p><sup>2</sup><b><u>If the manufacturer declares that the primary sensing element “software” is integral, has no end user interface and no print capability, the version/revision shall be hard marked on the device. Example: Primary sensing element may be Positive Displacement (P.D.) meter with integral correction, digital load cell (only for reference, not limiting).</u></b></p> <p><sup>3</sup><b><u>If the Certificate of Conformance number is to be displayed via menu and/or submenu, the means of access must be easily recognizable. In addition, instructions on how to obtain the remaining required information not hard-marked or continuously displayed shall be included on the NTEP CC.</u></b></p>		

**(Added 201X)**

**9. G-S.8.1. Access to Calibration and Configuration Adjustments, Proposed Changes to Language**

Source: NCWM S&T Committee

Background: The S&T Committee has considered multiple proposals to modify G-S.8. Provision for Sealing Electronic Adjustable Components and associated subparagraphs G-S.8.1. and G-S.8.2. The Committee agreed that if a device designed for commercial applications is capable of being “sealed” with external or remote access to the calibration or configuration mode, it is clearly in violation of the current G-S.8. Provision for Sealing Electronic Adjustable Components and G-S.2. Facilitation of Fraud and, therefore, no change to the existing language is needed. However, because of the ongoing disagreement on the interpretation of G-S.8. among the NTEP laboratories, the Committee agreed to make changes to the proposal based on the concerns raised during multiple open hearings.

Although multiple iterations of proposed language have been submitted, reviewed, and discussed, at the 2009 NCWM Interim Meeting, the Committee concluded that the item is not ready for a vote. However, the Committee decided to maintain the item on its agenda in anticipation that language would be developed by the 2010 Interim Meeting.

During the 2009 NCWM Annual Meeting, the S&T Committee received comments during the open hearing that no action may be needed and that the existing language in HB 44 is sufficient. Additional comments indicated that other proposals are overly complex. Oregon and Maryland believe that amended requirements for sealing are needed by the NTEP labs and field officials in order to consistently interpret and apply sealing requirements.

The Committee believes that all parties agree with the intent of the proposal. Both the WMD and SMA proposals include language that restates the existing language in G-S.8., but is essentially reformatted for clarification. Additionally, both proposals include new requirements for providing indications when a device is in adjustment mode. WMD included further language to address devices that may have more than one method of sealing.

Proposals considered by the Committee are outlined in the table below.

At the 2008 NCWM Annual Meeting, the Committee drafted and considered the following proposed changes:

The S&T Committee redrafted the language in paragraph G-S.8.1. and submitted the following revised language for G-S.8.1. to the regional weights and measures associations for further review and consideration.

**G-S.8.1. Access To Calibration and Configuration Adjustments - Electronic Devices. – An electronic device shall be so designed that access to calibration and configuration modes, including external and remote access, are only permitted when:**

- (a) the application of the physical security seal shall ensure that the access to the calibration and configuration modes is disabled, or**
- (b) the calibration and configuration adjustments are protected by an approved ~~category 1, 2, or 3~~ audit trail, and the device shall clearly and continuously indicate and print, if equipped with a printer, that the calibration and configuration adjustment modes are enabled.**

**During the calibration and configuration adjustment mode, electronic devices shall either;**

- not provide metrological indications that can be interpreted, or transmitted into memory, or printed while it is in the calibration and/or configuration adjustment mode as a correct measurement value, or**
- clearly and continuously indicate that it is in the calibration and/or configuration adjustment mode and record such message if capable of printing in this mode.**

**(Nonretroactive as of January 1, 201X)**

At its Fall 2008 Meeting, the SMA supported the intent of the item, but proposed the following alternative:  
At its 2008 fall meeting, the SMA supported the intent of the item and recommends the following language:

**G-S.8.1. Access to Calibration and Configuration Adjustments. – A device shall be so designed that:**

- (a) The application of the physical security seal shall ensure that the calibration and configuration modes are disabled, or**
- (b) The calibration and configuration adjustments are protected by an approved category 1, 2, or 3 method of sealing, and the device shall clearly and continuously indicate and print, if equipped with a printer, that the calibration and configuration adjustment modes are enabled.**

**During the calibration and configuration adjustment mode, electronic devices shall either;**

- The device shall not provide metrological indications that can be interpreted, or transmitted into memory, or printed while it is in the calibration and/or configuration adjustment mode as a correct measurement value, or**

- *The device shall clearly and continuously indicate that it is in the calibration and/or configuration adjustment mode and record such message if capable of printing in this mode.*

*Nonretroactive as of January 1, 201X)*

*(Added 201X)*

Following the 2009 Interim Meeting, NIST WMD developed the following alternative. This proposal would reformat G-S.8.1. for easier reading, recommended language for device indications and recorded representations while in the adjustment mode, and proposed language to recognize that devices may have both audit trails and physical seals for different components of a device (e.g., a physical seal for meter adjustments and an event counter for blend settings).

*G-S.8. Provision for Sealing Electronic Adjustable Components. – A device shall be designed with provision(s) for: ~~applying a security seal that must be broken, or for using other approved means of providing security (e.g., data change audit trail available at the time of inspection), before any change that detrimentally affects the metrological integrity of the device can be made to any electronic mechanism.~~*

*(a) applying a physical security seal that must be broken, or*

*(b) using other approved means of providing security (e.g., data change audit trail available at the time of inspection)*

*before any change that detrimentally affects the metrological integrity of the device can be made to any electronic mechanism.*

*[Nonretroactive as of January 1, 1990]*

*(Amended 201X)*

A device may be fitted with an automatic or a semi-automatic calibration mechanism. This mechanism shall be incorporated inside the device. After sealing, neither the mechanism nor the calibration process shall facilitate fraud.

(Added 1985) (Amended 1989 and 1993)

*G-S.8.1. Multiple Weighing or Measuring Elements that Share a Common Provision for Sealing. - (Unchanged)*

*G-S.8.2. Multiple Sealing Methods. – Weighing and measuring devices may be approved for use with multiple methods for sealing adjustable components such as physical seals for calibration adjustment (e.g., load cells, meters, etc.) and event counters or event logger for the configuration parameters (e.g., capacity, interval size, octane blend settings, etc.).*

*[Nonretroactive as of January 1, 1990]*

*(Added 201X)*

*G S.8.3. Adjustment Mode Indications. – During the calibration and configuration adjustment mode, the device shall:*

*(a) Not provide metrological indications that can be interpreted, or transmitted into memory, or printed while it is in the calibration and/or configuration adjustment mode as a correct measurement value, or*

*(b) Clearly and continuously indicate that it is in the calibration and/or configuration adjustment mode, and record such message if capable of printing in this mode.*

*Nonretroactive as of January 1, 201X)*

*(Added 201X)*

## 10. Temperature Compensation for Liquid Measuring Devices Code

**Source:** NCWM S&T Committee

**Background:** The NCWM S&T Committee is considering a proposal to modify Section 3.30. Liquid-Measuring Devices (LMD) Code by modifying paragraphs S.2.6., S.2.7.1., S.2.7.3., N.4.1.1.(a) and (b), N.5., UR.3.6.1.1., and UR.3.6.1.2., to add new paragraphs S.1.6.8., S.2.7.2., S.4.3., UR.3.6.1.3., and UR.3.6.4., and to renumber other existing paragraphs as appropriate to recognize temperature compensation for retail devices.

Based on comments heard from the floor at the 2009 NCWM Annual Meeting, the S&T Committee acknowledged that additional work may be needed to specific sections of the proposed changes to the code. Points raised and discussed by the Committee include the following:

- There was a question of whether to reference “15 degrees C” or “15.56 degrees C.” The Committee agreed that industry practice has been to use “15 degrees C” and that this is the reference used internationally; consequently, they believe it should be kept as “15 degrees C.” This is also supported by the L&R Committee’s 2009 Interim Report which references a statement by the Meter Manufacturers’ Association indicating that 15 degrees C is used internationally and industry would likely follow that convention should SI units be used.
- Clarification is needed for the differences between wholesale devices and systems. Specific paragraphs in question were S.1.6.8. and S.2.7.2.
- Clarification is needed for how S.2.7.2. applies to electronic registers that can only indicate in terms of compensated quantities when the compensator is activated; the compensator would need to be activated and an additional run completed in order to view an uncompensated reading.
- Review the use of the term “invoice” and consider if the term is well understood for retail transactions which have typically used terminology such as “printed receipt” or recorded representation.
- Review the language in the VTM code under Item 331-2 and consider where changes might be needed to ensure consistency.

The Committee decided to keep the status of this item as an “Information” item and acknowledges that some jurisdictions are already facing the imminent possibility of such equipment in their jurisdictions. The Committee believes that these standards are necessary whether or not the issue of a model method sale regulation is adopted in NIST Handbook 130 since weights and measures jurisdictions may decide to permit this equipment based upon their individual State laws or regulations.

**Recommendation:** The Sector is asked to provide input to the S&T Committee on the following proposed changes and the points noted above.

The S&T Committee is considering the following proposed changes to the LMD Code:

**S.1.6.8. Recorded Representations from Devices with Temperature Compensation. – Receipts issued from devices or systems with activated automatic temperature compensation must include a statement that the volume of the product has been adjusted to the volume at 15 °C for liters or the volume at 60 °F for gallons.**

**[Nonretroactive as of January 1, 201X]**

**(Added 201X)**

**Renumber existing S.1.6.8. Lubricant Devices, Travel of Indicator to S.1.6.9., accordingly.**

### **S.2.7. Wholesale Devices Equipped with Automatic Temperature Compensators.**

**S.2.7.1. Automatic Temperature Compensation.** – A device may be equipped with an automatic means for ~~adjusting~~**conversion of** the indication and registration of the measured volume of product to the volume at 15 °C **for liters or (60 °F) for gallons.**

**S.2.7.2. Display of Temperature.** – **For test purposes, on a device equipped with active automatic**

temperature compensation, means shall be provided to indicate or record the temperature determined by the system sensor to an a resolution of no greater than 0.2 °F.  
[Nonretroactive as of January 1, 201X]

**S.2.7.23. Display of Net and Gross Quantity and Provision for Deactivating.** – A device or system equipped with an active electronic automatic temperature-compensating mechanism shall indicate or record both the gross (uncompensated) and net (compensated) volume for testing purposes. On a device or system equipped with an mechanical automatic temperature-compensating mechanism that will indicate or record only in terms of ~~gallons~~ liters compensated to 15 °C or gallons compensated to (60 °F), provision shall be made for deactivating the automatic temperature-compensating mechanism so that the meter can indicate, ~~and record if it is equipped to~~ record, in terms of the uncompensated volume. It is not necessary that both net and gross volume be displayed simultaneously on a device or system equipped with either mechanical or electronic temperature-compensating mechanisms.

(Amended 1972 and 201X)

**S.2.7.34. Provision for Sealing Automatic Temperature-Compensating Systems.** – Provision shall be made for applying security seals in such a manner that an automatic temperature-compensating system cannot be disconnected and that no adjustment that detrimentally affects the metrological integrity of the device may be made to the system without breaking the seal or automatically providing a record (e.g., audit trail) of the action.

(Amended 201X)

S.2.7.4.1. Provision for Sealing the Temperature Sensor. – Provision shall be made for applying security seals in such a manner that the temperature sensor cannot be removed or disabled without breaking the seal or providing a record (e.g., audit trail) of the action.  
[Nonretroactive as of January 1, 201X]

**S.2.7.4.5. Temperature Determination with Automatic Temperature Compensation.** – For test purposes, means shall be provided (e.g., thermometer well) to determine the temperature of the liquid either:

- (a) in the liquid chamber of the meter, or
- (b) immediately adjacent to the meter in the meter inlet or discharge line.

(Amended 1987)

**S.4.3.2. Temperature Compensation.** – If a device or system is equipped with active automatic temperature compensation, the primary indicating elements, recording elements, ~~or and~~ recorded representation shall be clearly and conspicuously marked to show that the volume delivered has been adjusted to the volume at 15 °C for liters or (60 °F) for gallons.

(Amended 201X)

**Renumber existing paragraphs and subparagraphs S.4.3. Wholesale Devices, Discharge Rates and S.4.4. Retail Devices accordingly.**

**N.4.1.1. Wholesale Devices Equipped with Automatic Temperature-Compensating Systems.** – On ~~wholesale~~ devices equipped with active automatic temperature-compensating systems, normal tests shall be conducted:

- (a) by comparing the net (compensated) volume indicated or recorded to the actual delivered volume ~~corrected-adjusted~~ to 15 °C for liters or (60 °F) for gallons, and
- (b) ~~with the temperature-compensating system deactivated,~~ comparing the gross (uncompensated) volume indicated or recorded to the actual delivered volume. (For some devices this may require that the temperature compensator be deactivated.)

The first test shall be performed with the automatic temperature-compensating system operating in the “as found” condition. On devices that indicate or record both the compensated and uncompensated volume for each delivery, the tests in (a) and (b) may be performed as a single test.

(Amended 1987 ~~and 201X~~)

**N.5. Change in Product Temperature-Correction on Wholesale Devices. – ~~Corrections-Adjustments~~ shall be made for any changes in volume resulting from the differences in liquid temperatures between time of passage through the meter and time of volumetric determination in the prover or test measure. When adjustments are necessary, appropriate petroleum measurement tables ~~should~~shall be used.**

(Amended 1974 ~~and 201X~~)

### **UR.3.6. Temperature Compensation, Wholesale.**

#### **UR.3.6.1. Automatic.**

**UR.3.6.1.1. ~~When to be Used of Automatic Temperature Compensation.~~ – If a device is equipped with a ~~mechanical-active~~ automatic temperature ~~compensator-compensation~~, it shall be connected, operable, and in use at all times. An electronic or mechanical automatic temperature-compensating system may not be removed, nor may a compensated device be replaced with an uncompensated device, without the written approval of the ~~responsible~~ weights and measures jurisdiction with statutory authority over the device.**

[**Note:** This requirement does not specify the method of sale for product measured through a meter.]

(Amended 1989 ~~and 201X~~)

OR

**UR.3.6.1.1. ~~When to be Used of Automatic Temperature Compensation.~~ – If a device is equipped with a mechanical automatic temperature compensator, it shall be connected, operable, and in use at all times. Once used, An electronic or mechanical automatic temperature-compensating system may not be removed nor deactivated, nor may a compensated device be replaced with an uncompensated device, without the written approval of the ~~responsible~~ weights and measures jurisdiction with statutory authority over the device.**

[**Note:** This requirement does not specify the method of sale for product measured through a meter.]

(Amended 1989 ~~and 201X~~)

**UR.3.6.1.2. Condition of Use. – At a business location which offers fuel products for retail sale on the basis of a temperature-compensated volume, all devices used for retail sales shall have active automatic temperature compensation and all fuel products offered for retail sale shall be dispensed on the basis of temperature-compensated volume.**

#### **UR.3.6.1.23. Recorded Representations (Invoices, Receipts, and Bills of Lading).**

- (a) ~~An written~~-invoice based on a reading of a device or recorded representation issued by a device or system that is equipped with an active automatic temperature compensator shall show that the volume delivered has been adjusted to the volume at 15 °C for liters or (60 °F) for gallons and decimal subdivisions or fractional equivalents thereof.
- (b) The invoice issued from an electronic wholesale device equipped with an automatic temperature-compensating system shall also indicate:
  - (1) the API gravity, specific gravity or coefficient of expansion for the product;
  - (2) product temperature; and
  - (3) gross reading.

(Amended 1987 and 201X)

**UR.3.6.1.4. Temperature Determination. – The means for determining the temperature of measured liquid in a device with an activated automatic temperature-compensating system shall be so located and designed that, in any “usual and customary” use of the system, the resulting indications and/or recorded representations are within applicable tolerances.**

**(Added 201X)**

**UR.3.6.4. Temperature-Compensated Sale. – All sales of products, when the quantity is determined by an approved measuring system with temperature compensation, shall be in terms of the liter at 15 °C or the U.S. gallon of 231 in<sup>3</sup> at 60 °F.**

**(Added 201X)**

### 11. T.2.1. Tolerances – Vehicle-Tank Meters (VTMs)

**Background:** The S&T Committee continues to consider the following proposed changes to decrease the ATC tolerances on VTMs.

**T.2.1. Automatic Temperature-Compensating Systems.** – The difference between the meter error (expressed as a percentage) for results determined with and without the automatic temperature-compensating system activated shall not exceed:

- (a) **0.40.2** % for mechanical automatic temperature-compensating systems; and
- (b) **0.20.1** % for electronic automatic temperature-compensating systems.

The delivered quantities for each test shall be approximately the same size. The results of each test shall be within the applicable acceptance or maintenance tolerance.

**(Amended 201X)**

The Committee requested data (in addition to that provided by the submitter) to be submitted in either support or opposition to the proposed changes. At the 2009 Annual Meeting, the Committee reported that it received additional VTM test data from the State of Maine. This data supports the proposed change to the tolerances; the change would not impact the compliance rate for the devices included in these tests. The Committee noted that to date it has received only data in support of the proposed change.

The Committee heard opposition from the Meter Manufacturers Association and received a letter from David Rajala (Veeder-Root) expressing similar concerns over the proposed change to the tolerances. Both expressed concerns over the test procedures and test equipment that might be used by some jurisdictions, noting that, should non-NIST traceable thermometers or improper test procedures be used, the proposed tolerances would be too small.

**Recommendation:** The Committee asks for additional input from the Measuring Sector regarding these proposed changes. Data in support or opposition of the changes would be appreciated.

### 12. Water Meters – Test Draft Sizes, Repeatability Tests, and Tolerance Values

**Background:** The S&T Committee has reviewed multiple proposals to modify the test procedures and tolerances associated with testing water meters under NIST Handbook 44 Section 3.36. Water Meters Code. These proposals were included on the Committee’s 2009 agenda under Information Item 336-3 N.3. Test Drafts and N.4. Testing Procedures and Developing Item. The water meter manufacturers who submitted the proposed changes have expressed concerns that the test draft sizes for some tests are not adequate and may result in erroneous test results. These manufacturers are also proposing that the test procedures and draft sizes be aligned with the standards of the American Water Works Association.

At the 2009 Annual Meeting, the S&T Committee reported receiving additional data from the water meter manufacturers; a comparison of current H44 requirements, AWWA standards, and the proposed changes; comments from NIST WMD; and excerpts from corresponding international standards.

The above information as well as correspondence between the water meter manufacturers and the S&T Committee is available upon request from the Sector technical advisor and S&T Committee technical advisor, Tina Butcher.

The Committee recently received eight additional alternate proposals from five water meter manufacturers. These proposals are being discussed between the five manufacturers, the State of California Division of Measurement Standards (including S&T Committee member Kristin Macey), and several California counties (including S&T Committee Chairman, Brett Saum). The Committee anticipates receiving an update of any revisions to be submitted to the Fall regional weights and measures associations prior to the 2009 Measuring Sector meeting. Since the proposals are still being debated, a copy of these proposals will be forwarded to the Committee when they become available, likely after the Western Weights and Measures Association meeting.

**Recommendation:** The Sector is asked to provide any comments regarding the proposed changes to the S&T Committee.

### 13. Draft Code Section 3.3X. Hydrogen Gas-Measuring Devices

**Source:** NCWM S&T Committee

**Background:** The NCWM S&T Committee's Agenda added a new item to its Developing Item in 2008 to recognize work being done to develop a code for commercial hydrogen gas-measuring devices by the U.S. National Work Group for the Development of Commercial Hydrogen Measurement Standards. The Work Group, which presently includes weights and measures officials, manufacturers and users of hydrogen measuring devices, and federal agency representatives, continues to look for input and participation from the weights and measures community in the development of the code and associated test procedures. The most current version of the draft code can be found on NIST WMD's home page at <http://ts.nist.gov/WeightsAndMeasures/Developing-Commercial-Hydrogen-Measurement-Standards.cfm>. This web page is a resource for the U.S. weights and measures and hydrogen community regarding the latest information and status of ongoing work to develop uniform and appropriate legal metrology standards for commercial hydrogen measurements.

At its August 2009 meeting, the USNWG on Hydrogen agreed that the code is ready to propose for adoption as a tentative code, with the caveat that some additional verification needs to be completed over the coming months to validate the proposed tolerances and test notes.

**Recommendation:** This item is included on the Sector's agenda to make the Sector aware of the work and to encourage input and participation from Sector members. A copy of the most recent draft code will be provided to the Sector for reference.