NTEP - Measuring Sector
Meeting Agenda

September 20, 2022, 8:00 am to 5:00 pm EDT and September 21, 2021, 8:00 am to 5:00 pm EDT
Historic Inns of Annapolis, 58 State Circle, Annapolis, MD

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)
EVFS	Electric Vehicle Fueling Systems	PD	Positive Displacement
HB 44	NIST Handbook 44 "Specifications, Tolerances, and Other Technical Requirements for Weighing and Measuring Devices"	Pub 14	NCWM Publication 14
LMD	Liquid Measuring Devices	RMFD	Retail Motor-Fuel Dispenser
mA	milliamp	SI	International System of Units
MFM	Mass Flow Meters	S&T	Specifications and Tolerances
NCWM	National Conference on Weights and Measures	TG	Task Group
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. Change to Handbook 44, 3.30. Liquid-Measuring Devices Code, Table T.2 Accuracy Class and Tolerances for Liquid Measuring Devices Covered in NIST Handbook 44, Section 3.30. (2022 S&T Committee Agenda Item LMD-22.1)

Background: This item started in 2019 when changes to Handbook 44 were adopted that changed the reference to a "Retail Motor-Fuel Devices" to "Retail Devices" and added a reference for a "DEF" device. All of the proposed changes were adopted in 2019. The members of the Measuring Sector reviewed and acted on these changes by proposing similar changes to Publication 14, LMD Checklist. These changes were presented to the members of the Measuring Sector at their 2021 meeting, during which the members agreed to include the changes. At the same Measuring Sector Meeting, the membership agreed that one additional change to the handbook should be proposed to the S&T Committee. A Form 15 was written and submitted on behalf of the Measuring Sector for inclusion in the 2022 NCWM Meeting cycle.

The proposal was added to the S&T Committee agenda as Item LMD-22.1 and recommended the addition of the words "and retail DEF" to footnote 1 of Table T.2.

During the 2021 Measuring Sector Meeting, the members agreed that if this item pass at the 2022 NCWM Annual Meeting, the item being discussed from 2019 to 2021 would be considered complete and removed from the Sector's agenda.

During the 2022 NCWM Annual Meeting, Item LMD-22.1 was adopted via the Consent Calendar.

Recommendation: No additional work on this item is needed.

Discussion:

2. Increase the Automatic Timeout at Pay-At-Pump Retail Motor-Fuel Devices

Background: At its 2020 Annual Meeting, the NCWM adopted changes to the LMD Code in Handbook 44 related to the de-authorize timeout at pay-at-pump retail motor fuel devices. The Measuring Sector members review and agreed to proposed changes to the 2021 edition of Publication 14, LMD Checklist. However, during the Measuring Sectors 2021 meeting an additional change was proposed for the 2022 edition of Publication 14, LMD Checklist.

During the 2021 Measuring Sector Meeting, the members agreed that if the change was made, this item would be considered complete and removed from the Sector's agenda.

Recommendation: The 2022 edition of Publication 14, LMD Checklist was made. No additional work on this item is needed.

Discussion:

New Items:

3. Permanence of ID Badge

Source: California NTEP Laboratory

Background: It was noted that the Permanence section of Pub 14 LMD does not include anything about leaving a "footprint or destroys itself" when attempting to remove an ID badge. It is necessary to point out that in Publication 14 under Checklists and Test Procedures for Common Specific Code Requirements, item 1.11 on page LMD-23, it states "1.1. The identification badge must be permanent". However, it offers no method to confirm this requirement.

The question to the membership is weather some guidance should be added to the Checklist for testing the permanence of the attachment of the badge.

Recommendation: No specific recommendation is being offered, however, if the members agree that there should be something in the Checklist, I offer the following extract from the 2022 edition of the Publication 14, Checklist for Digital Electronic Scales,

Permanence of Attachment of Badge
Attempt to remove the badge by pulling it off or prying off a metal badge that is attached using only adhesive; removal must be "difficult" at all temperatures. If the badge can be removed, it must show obvious evidence that the badge was removed. Acceptable indications are destruction of the badge by tearing, permanent and extensive wrinkling, or repeated exposure of the word "VOID" upon removal of the badge.

Discussion:

4. Permanence Test for A Stationary Analog Register

Source: 2022 NTEP Laboratory Meeting

Background: During an evaluation, the evaluator noted that Publication 14, LMD Checklist mentions the requirement for a permanence test of analog registers when installed and operated on a Vehicle Tank Meter but is silent if the register is installed in a stationary application.

The NTEP evaluators discussed this and concluded that the checklist should include the requirement of a permanence test for analog registers installed in a stationary application. The evaluators' reviewed the existing permanence testing requirements and agreed that the test should be for a length of 20 days.

A small group consisting of Randy Ramsey (NC NTEP Evaluator), Tina Butcher (NIST), and Darrell Flocken (NTEP Administrator) discussed this afterward and suggested that a proposal should be presented to the Measuring Sector Member

Recommendation: The NTEP Administrator developed the following proposal.

Proposed change: Change: (Pg LMD-119 of the 2022 edition of Pub 14. Measuring)

A. Laboratory and Field Evaluation – Electronic ~~Devices~~ **Indicating Element** and Software

(No other changes to paragraph A.)

Add the following new information in its entirety.

B. Laboratory and Field Evaluation – Analog Indicating Element Submitted Separate from a Measuring Element

1. Use of Simulated Inputs:

The use of simulated inputs is not accepted when evaluating analog indicating elements submitted separate from a measuring element.

2. Field and Permanence Test of Analog Devices Subject to Evaluation:

Field Evaluations and Permanence Testing - General

When necessary, permanence testing consists of conducting an initial test followed by a subsequent test. The device shall be used under conditions of normal use during the permanence period. The conditions of use and duration of the test shall be as agreed upon between the evaluating laboratory and the manufacturer.

A permanence test is required for all mobile analog "devices". The term "devices" refers to indicators/calculators, controllers, and registers. Permanence testing shall be conducted as follows to satisfy the permanence testing criteria for mobile analog devices.

During the permanence period, the device must perform, and function correctly and not be serviced.

a. Mobile Analog Devices: ?should this be called a "Mobile Analog Indicating Device"?

- **Initial Evaluation:**
  The device will be installed on a vehicle and testing according to the NTEP checklist criteria and performance requirements by the evaluating NTEP laboratory.
- **Permanence Period Requirements:**
  The device will be put into normal use for a period of 20-days under the following conditions:
  1. For each "day" of the 20-day period, the device must be used to make at least one delivery; each delivery shall consist of at least 10 gallons. It is not necessary for these days to be consecutive.
  2. There must be a minimum of 150 deliveries over the permanence period.
  3. The vehicle on which the electronic indicator/register is mounted shall travel at least 400 miles during the permanence period.
- **Subsequent Evaluation:**
  Following the defined permanence period, the device will be tested again by the evaluating NTEP laboratory to ensure the device continues to comply with applicable requirements.

b. Stationary Analog Devices: ?should this be called a "Stationary Analog Indicating Device"?

Note: Analog indicating elements having been evaluated to the permanence tests for a mobile device, do not require stationary permanence testing to be used in a stationary application.

- **Initial Evaluation:**
  The device will be installed on a vehicle and testing according to the NTEP checklist criteria and performance requirements by the evaluating NTEP laboratory.

- **Permanence Period Requirements:**
  The device will be put into normal use under the following conditions:
  1. Four test drafts for each flow rate
  2. A minimum of four flow rates shall be used with one being near minimum and one being near maximum as defined by the evaluation requirements for the meter it is going to be used with. If the analog device is intended to be across a range of meters, the testing will be expanded to include the flow rates of the additional meters.
  3. The analog device must be reset to zero between tests.
- **Subsequent Evaluation:**
  Following the defined permanence test, the device will be tested again by the evaluating NTEP laboratory to ensure the device continues to comply with applicable requirements.

Renumber all following items appropriately

Discussion:

5. Discussion on Adding Hydrogen to the Product Family Table in Publication 14

Source: Michael Keilty, Endress+Hauser Flow

Background: The Hydrogen Gas-Measuring Devices Code was adopted as a full code in 2019. The sector has not integrated the HB 44 requirements into Publication14. One part of that process is to integrate Hydrogen Gas into the Product Family Table. Other parts of 3.39 Hydrogen Gas-Measuring Devices Code should be reviewed for inclusion in Pub 14.

Discussion:

6. General Discussion Regarding the NTEP Committee Agenda Item ADM-21.5

Source: NTEP Administrator

Background: The NTEP Committee has item ADM-21.5 on its agenda to receive comments from NCWM industry members that will be impacted if the proposed amendment to the Verified Conformity Assessment Program (VCAP) Policy is recommended for and adopted by the NCWM Board of Directors. The item is titled:

ADM-21.5 I Expand VCAP to Include Devices That do not Require Influence Factor Testing during the NTEP Certification Evaluation

In summary, the proposal is an Informational item intended to extend the list of devices where the holder of an Active NTEP Certificate of Conformance, for the device, must comply with the requirements of the VCAP Policy. A copy of the NTEP Committee agenda item is being distributed with this meeting agenda and will be available on the Measuring Sectors web page under the 2022 Meeting Documents.

If this VCAP Policy change is approved, it will most likely impact each manufacturer or private label Certificate of Conformance holder of a measuring device. In addition, seeing that the NTEP

Committee has heard no comments from the NCWM Membership since this item was first presented, one Measuring Sector Member felt this item should be place on this meeting agenda to raise awareness.

Discussion:

7. General Discussion Regarding S&T Committee Agenda Block 7

Source: S&T Committee Agenda from Pub 15 for the 2023 NCWM Interim Meeting

Block 7 items (B7) Tolerances on Tests Using Transfer Standards

Source:

Seraphin Test Measure Company, A Division of Pemberton Fabricators, Inc.

Purpose:

The purpose of these proposals is to change the language in the tolerance paragraphs that already specify that larger tolerances when a transfer standard is used, but that the OIML R117 Reduced MPE formula shall be used. Unless the proposed changes to 2021 S&T Agenda Block 1 Item GEN-19.1. are accepted, these proposals should not proceed.

B7: CLM-22.1 D T.3. On Tests Using Type 2 Transfer Standards.

Item Under Consideration:
Amend Handbook 44, Cryogenic Liquid-Measuring Devices Code as follows:

T.2. **On Tests Using Type 2 Transfer Standards.** – To the basic tolerance values that would otherwise be applied, there shall be added an amount equal to two times the standard deviation of the applicable transfer standard when compared to a basic reference standard. **When commercial meters are tested using a Type 2 transfer standard, the tolerance applied to the meter under test shall be calculated using the formula specified in the General Code Tolerance section.**
(Amended 202X)

B7: CDL-22.1 D T.3. On Tests Using Type 2 Transfer Standards.

Item Under Consideration:
Amend Handbook 44, Carbon Dioxide Liquid-Measuring Devices Code as follows:

T.3. On Tests Using Type 2 Transfer Standards. – To the basic tolerance values that would otherwise be applied, there shall be added an amount equal to two times the standard deviation of the applicable transfer standard when compared to a basic reference standard. **When commercial meters are tested using a Type 2 transfer standard, the tolerance applied to the meter under test shall be calculated using the formula specified in the General Code Tolerance section.**
(Amended 202X)

B7: HGM-22.1 D T.4. Tolerance Application on Tests Using Type 2 Transfer Standard Test Method.

Item Under Consideration:
Amend Handbook 44, Hydrogen Gas-Measuring Devices Code as follows:

T.4. Tolerance Application on Tests Using Transfer Standard Test Method. – To the basic tolerance values that would otherwise be applied, there shall be added an amount equal to two times the standard deviation of the applicable transfer standard when compared to a basic reference standard. **When commercial meters are tested using a Type 2 transfer standard, the tolerance applied to the meter under test shall be calculated using the formula specified in the General Code Tolerance section. (Amended 202X)**

Previous Action:
2022: Developing

Original Justification:
In the codes mentioned above, when transfer standards are used, the basic tolerances to be applied to the devices under test are to be increased by the uncertainty of the transfer standard (i.e., two times the standard deviation of the transfer standard). The proposed changes incorporate the OIML R117 formula to state how the tolerance is to be increased when transfer standards are used. The formula effectively places an upper limit on how large the uncertainty associated with the transfer standard can be.

This item has been assigned to the submitter for further development. For more information or to provide comment, please contact:

Mr. Bob Murnane
Seraphin Test Measure Co.
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The current paragraphs already state that, when transfer standards are used, the tolerances are to be increased by two standard deviations for the repeatability of the transfer standard. One can argue that effect of the proposed changes is small and not necessary. The proposed changes are intended to provide consistency with the changes proposed in the amended proposals of 2021 S&T Agenda Block 1 Item GEN-19.1.

The submitter requested that this be a Voting Item in 2022.

Comments in Favor:

Regulatory:
•

Industry:
• Bob Murnane (Seraphin) explained the addition of "Type 2" term.

Advisory:
•

Comments Against:

Regulatory:
•

Industry:

- A revised version by Seraphin (submitter) was presented and made available on the NCWM website to properly align with GEN 19.1. The submitter requests that Block 7, Gen 19.1 and related item OTH 21.1 follow the same path moving forward.
- Dmitri Karimov (Liquid Controls) commented that the Block is linked to GEN 19.1 due to definition of Type 1 and 2 transfer standards. Mr. Karamov said it seems odd to single out Type 2. He explained T.1-3 restates what's in GEN 19.1 and recommends the Block to be withdrawn and GEN 19.1 move forward.

Advisory:

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Neutral Comments:

Regulatory:

- Matt Douglas (California) recommends this Block and the associated items be given developing status.

Industry:

- Dmitri Karimov representing the Meter Manufacturers Association (MMA) stated that there was no consensus within the MMA.

Advisory:

- Diane Lee (NIST, OWM) who provided a brief overview of the written NIST analysis, which can be found on the NCWM website. This item is related to GEN 19.1 and OTH 22.1.

Item Development:

NCWM 2022 Interim Meeting: The committee recommended that this item be given a developing status to allow the submitter to work on it. Since the 2022 interim meeting, the submitter has made additional changes to the items under consideration which are currently reflected in Block 7 above. These changes reference using the specific formula in the general code tolerance section, rather than a formula specified here.

NCWM 2022 Annual Meeting: Seraphin was not present but submitted comments in writing to update the Items under Consideration.

Background and Discussion:

Seraphin and NIST OWM are working together in a joint effort to address changes to Block 7 items which are impacted by changes being made to GEN-19.1. Seraphin made changes to the Block 7 items that appear in the 2022 Interim Meeting Agenda to make it clear that the tolerances apply to Type 2 transfers standards as stated in the definitions included in the combined proposal GEN-19.1 and OTH-22.1. Additionally, the tolerances in the specific codes refer to the NIST HB 44 General Code Tolerance section rather than providing the equation in each Tolerance section in the Liquid Measuring Devices Code, Carbon Dioxide Liquid-Measuring Devices, and Hydrogen Gas-Measuring Devices Code. Although changes will be needed to the Taximeter and Transportation Network Measuring Systems Code, Block 7 is limited to measuring devices and if these changes are accepted, other industry sectors will be involved in making similar changes as they apply to their specific Handbook 44 codes.

If the S&T Committee presents the combined item GEN-19.1 and OTH-22.1 for a vote in 2022, then this item may also go forward for a vote in 2022.

Regional Associations' Comments:

WWMA 2021 Annual Meeting: Bob Murnane (Seraphin): submitter: this needs to go with the GEN-19. Marc Buttler (Emerson Micro Motion): wants to re-state : earlier comment on GEN item would also apply to calculation on this. He will adjust the calculation to increasing tolerance from decreasing. Bob Murnane (Seraphin): they have looked at original comments in GEN 19: they will have info for us shortly. A letter was submitted to the Committee by Marc Buttler (Emerson Micro Motion) and will be posted to the WWMA website.

The WWMA S&T Committee recommends that this Block be assigned a developmental status. The Committee recommends that item GEN-19.1 be inserted into Block 7.

SWMA 2021 Annual Meeting: Mr. Oppermann, Seraphin, stated that this item is related to Gen 19.1, and should not move forward unless Gen 19.1 moves forward as well.

This committee recommends this item be assigned Developing status.

CWMA 2022 Annual Meeting: Bob Murnane – Seraphin - Remain developing, can't move to voting item unless OTH-22.1 does move to voting.

The CWMA S&T Committee recommends this moves forward as a voting item, with the understanding that Block 8 must first pass.

NEWMA 2022 Annual Meeting: No comments were heard from the body on this item, however, the committee recognizes the need to further develop this block.

Additional letters, presentation and data may have been submitted for consideration with this item. Please refer to www.ncwm.com/publication-15 to review these documents.

Discussion:

This item was placed on the meeting agenda at the request of the sector members. The item is added for discussion only. This meeting is the perfect opportunity to discuss S&T Committee agenda items, however, the discussion will not be documented in the sector meeting summary.

8. General Discussion Regarding S&T Committee Agenda Block 8

Source: S&T Committee Agenda from Pub 15 for the 2023 NCWM Interim Meeting

Block 8 items (B8) Tolerances on Tests Using Transfer Standards, Appendix A - Tolerances for Stadards, and Appendix D – field stanards and transfer standards

Note: These proposals are a combined modification of the 2021 S&T Agenda Block 1 Items GEN-19.1 and OTH-22.1. Since the S&T Committee has changed item GEN-19.1 from "assigned" to "developing," the submitter has worked with NIST OWM to revise and combine the original proposals of GEN-19.1 and OTH-22.1 to address discussions within the NCWM Field Standards Task Group and other comments received at the regional weights and measures meetings on the proposals. These items are related, so they are presented together. These OWM and Seraphin proposals were submitted to the S&T Committee just before the 2022 Interim Meeting.

Note: The OWM and Seraphin proposals submitted to the S&T Committee just before the 2022 Interim Meeting were updated with two changes at the request of the Submitters following the 2022 Interim Meeting. The first change is in the definition of "Standard, Field." The words "(typically one year)" were replaced with "(as determined by the Director)". The second change was to add the words "to the International System of Units (SI)" in the section 3.1.3. of the Fundamental Considerations. These two changes are reflected in the items below.

Source:

Seraphin Test Measure Company (GEN-19.1) and NIST, Office of Weights and Measures (OTH-22.1)

Purpose:

(a) Add a tolerance statement to the General Code that applies whenever a Type 2 transfer standard is used;

(b) Clarify in the Fundamental Considerations (Appendix A of Handbook 44) that the authority to approve field test standards rests with the regulatory official and that specific types of field test standards need not be identified in the body of a Handbook 44 Code in order to be approved by the weights and measures director;

(c) Add text to Section 3.2. Tolerances for Standards of the Fundamental Considerations (Appendix A of Handbook 44) to recognize the wide range of transfer standards already recognized in Handbook 44, explain the critical differences between field standards and transfer standards, and to specify the formula to be used to calculate the device tolerance when the uncertainty of the transfer standard exceeds the one-third requirement; and

(d) Add definitions to Appendix D of Handbook 44 for field standard and Type 1 and Type 2 transfer standards that identify the critical characteristics for field and transfer standards.

B8: GEN-19.1 D G-T.5. Tolerances on Tests When Transfer Standards are Used., Appendix A, Section 3.2. Tolerances for Standards., and Appendix D – Definitions: standards, field., ~~transfer standard.~~ and standard, transfer.

Item Under Consideration:
Amend Handbook 44, General Code as follows**:**

G-T.5. Tolerances on Tests When Type 2 Transfer Standards Are Used. – When Type 2 transfer standards are used, the following formula shall be used to compute the tolerance applicable to the device under test:

Increased MPE = (2/3 x MPE + U)

with an upper limit of U_{MAX} = 2/3 MPE

Where MPE is the basic tolerance that applies when using a basic reference standard; and

U = uncertainty associated with the Type 2 transfer standard.

The increase in the applied tolerance when using a Type 2 transfer standard applies only to the basic tolerances for devices as defined in Handbook 44; that is acceptance, maintenance and minimum tolerances. Note that the repeatability tolerance and the special test tolerances are NOT increased.

Codes 5.56.(a) Grain Moisture Meters, 5.56.(b) Grain Moisture Meters, and 5.57. Near-Infrared Grain Analyzers are exempt from this requirement because NIST Handbook 159 has requirements for monitoring and retesting grain samples to ensure adequate stability and the tolerances for the devices under test already incorporate the uncertainty associated with the use of grain samples as transfer standards. The code 2.21. Belt-Conveyor Scale Systems Code is also exempt because relative and absolute tolerances are included in the code.

Amend Handbook 44 Appendix D – Definitions as follows.

Standard, Field. – A physical artifact, static or dynamic measurement device or a reference material that (a) meets the requirements of the Fundamental Considerations, Section 3.2., (b) is stable (accurate and repeatable) over an extended period of time (as determined by the Director), (c) is valid (corrections that may be used) over the range of environmental and operational parameters in which the commercial measuring devices are used, and (d) is traceable to the reference or working standards through comparisons, using acceptable laboratory procedures. [3.34, 3.38, 3.39, x.xx, x.xx…]

(Added 202X)

~~**transfer standard. A measurement system designed for use in proving and testing cryogenic liquid measuring devices. [3.38]**~~

Standard, Transfer, Type 1 and Type 2. − A physical artifact, static or dynamic measurement device or a reference material that is proven to be stable (accurate and repeatable) for a short time under the limited environmental and operational conditions during which the transfer standard is used. A Type 1 transfer standard is a transfer standard that meets the one-third accuracy requirement for a short time over a limited range of environmental conditions and/or a limited range of operating conditions in which it is used. A Type 2 transfer standard is one that does not meet the one-third requirement and may not be stable or valid over an extended time period or over wide ranges of environmental or operating conditions. (3.34, 3.38, 3.39, x.xx, x.xx…]

(Added 202X)

B8: OTH-22.1 D Appendix A: Fundamental Considerations, 3. Testing Apparatus

Item Under Consideration:
Amend Handbook 44, Appendix A: Fundamental Considerations as shown below. Delete Footnote 2 referenced in Section 3. Testing Apparatus of NIST Handbook 44 Appendix A, Fundamental Considerations, moving portions of the footnote into Section 3.1 as part of the proposed changes to Section 3.1 shown above. Note that no changes are proposed to Footnote 1.

[2] Recommendations ~~regarding the specifications and tolerances for suitable field standards may be obtained from the Office of Weights and Measures of the National Institute of Standards and Technology. Standards will meet the specifications of the National Institute of Standards and Technology Handbook 105 Series standards (or other suitable and designated standards). This section shall not preclude the use of additional field standards and/or equipment, as approved by the Director, for uniform evaluation of device performance.~~

3.1. Adequacy.[2] **–** Tests can be made properly only if, among other things, adequate testing apparatus is available. Testing apparatus may be considered adequate only when it is properly designed for its intended use, when it is so constructed that it will retain its characteristics for a reasonable period under conditions of normal use, when it is available in denominations appropriate for a proper determination of the value or performance of the commercial equipment under test, and when it is accurately calibrated.

3.1.1. Essential Elements of Traceability. To ensure that field test standards and test methods provide for measurements that are traceable to the International System of Units (SI), through NIST or other National Metrology Institutes, they must satisfy the "Essential Elements of Traceability." As explained in NIST IR6969 GMP-13 Good Measurement Practice for Ensuring Metrological Traceability, these elements include the following.

- **Realization of SI Units**
- **Unbroken Chain of Comparisons**
- **Documented Calibration Program**
- **Documented Measurement Uncertainty**
- **Documented Measurement Procedure**
- **Accredited Technical Competence**
- **Measurement Assurance**

3.1.2. Specifications for Standards. Standards will meet the specifications of the National Institute of Standards and Technology Handbook 105-Series standards or other appropriate designated documentary standards (e.g., ASTM, ASME, etc.). Recommendations regarding the specifications and tolerances for suitable field standards may be obtained from the Office of Weights and Measures of the National Institute of Standards and Technology.

3.1.3. Authority for Approving Field Test Standards and/or Equipment. This section shall not preclude the use of additional field standards and/or equipment, as approved by the Director, for uniform evaluation of device performance. Specific types of field test standards are not required to be identified in a NIST Handbook 44 code in order to be considered suitable. Provided the standards meet the "Essential Elements of Traceability" (described in Section 3.1.1. above) that help ensure the standards are suitable and capable of supporting measurements traceable to the International System of Units (SI) through NIST or other National Metrology Institutes, they need only be approved by the Director.

3.2. Tolerances for Standards. – Except for work of relatively high precision, it is recommended that the accuracy of **field** standards used in testing commercial weighing and measuring equipment be established and maintained so that the use of corrections is not necessary. When the **field** standard is used without correction, its combined error and uncertainty must be less than one-third of the applicable device tolerance.

Device testing is complicated to some degree when corrections to standards are applied. When using a correction for a standard, the uncertainty associated with the corrected value must be less than one-third of the applicable device tolerance. The reason for this requirement is to give the device being tested as nearly as practicable the full benefit of its own tolerance.

Whenever possible and practical, field standards should be used to test commercial devices. However, where it is impractical or unduly cumbersome to use field standards, transfer standards may be used. There are two categories of transfer standards. The critical criteria that distinguish between these standards are: (1) the accuracy and uncertainty of the standard; (2) the stability as a standard over an extended period; and (3) proven validity or performance of the standard over the range of environmental and operational conditions in which the standard may be used.

A "field standard" is one that meets the one-third requirement mentioned earlier in this section. Additionally, the field standard maintains its validity or stability as a standard over an extended period (defined based on data of the standard's stability by an authorized metrology lab or as specified by the Director) and is known to maintain its value as a standard over the full range of environmental conditions and the range of operating conditions in which the standard may be used to test commercial weighing and measuring devices. Corrections, as documented by an authorized metrology laboratory, may be used.

Transfer standards do not meet one or more of these critical criteria. One category of transfer standards, which is referred to here as a "Type 1 transfer standard," is a transfer standard that meets the one-third accuracy requirement for a short time, under a limited range of environmental conditions and/or a limited range of operating conditions. The accuracy of a Type 1 transfer standard may have to be verified through testing each time it is used to verify that the desired accuracy and performance can be achieved when the Type 1 transfer standard is used under the limited environmental and operating conditions. When a Type 1 transfer standard is used, the basic tolerances specified for the commercial measuring devices are applied as specified in the applicable codes.

The second category of transfer standard, which is referred to here as a "Type 2 transfer standard," is one that does not meet the one-third requirement. The Type 2 transfer standard must be stable and valid under the environmental or operating conditions in which it is used. The performance characteristics must be confirmed with sufficient data to properly characterize the uncertainty associated with the Type 2 transfer standard. When a Type 2 transfer standard is used, the tolerances applicable to the commercial weighing and measuring device must be increased to recognize the large uncertainty or corrections associated with the Type 2 transfer standard. When commercial meters are tested using a Type 2 transfer standard, the tolerance applied to the meter under test shall be determined as specified in the General Code.

(Added 202X)

3.3. Accuracy of Field Standards. – Prior to the official use of testing apparatus, its accuracy should invariably be verified. Field standards should be calibrated as often as circumstances require. By their nature, metal volumetric field standards are more susceptible to damage in handling than are standards of some other types. A field standard should be calibrated whenever damage is known or suspected to have occurred or significant repairs have been made. In addition, field standards, particularly volumetric standards, should be calibrated with sufficient frequency to affirm their continued accuracy, so that the official may always be in an unassailable position with respect to the accuracy of his testing apparatus. Secondary field standards, such as special fabric testing tapes, should be verified much more frequently than such basic standards as steel tapes or volumetric provers to demonstrate their constancy of value or performance.

Accurate and dependable results cannot be obtained with faulty or inadequate field standards. If either the service person or official is poorly equipped, their results cannot be expected to check consistently. Disagreements can be avoided and the servicing of commercial equipment can be expedited and improved if service persons and officials give equal attention to the adequacy and maintenance of their testing apparatus.

Previous Action:
2022: Developing

Background and Discussion:
NCWM 2022 Interim Meeting: Item GEN-19.1 was assigned to the original submitter, Seraphin, for further development. As noted at the beginning of this item Seraphin has worked with NIST OWM to revise and combine the original proposals of GEN-19.1 and OTH-22.1. Consequently, NIST OWM has asked that OTH-22.1 be combined with GEN-19.1. For more information or to provide comment, please contact:

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or

Ms. G. Diane Lee
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2022 NCWM Annual Meeting: The committee heard from Tina Butcher NIST, the submitter of the item. She stated that they had addressed items heard at the fall regional meeting and the 2022 interim NCWM meeting. She stated they felt the item as is ready to move forward in tandem with Block 7. The intent is to clarify that it isn't necessary to identify what type of standard is to be used, i.e.: provers aren't referenced in section 3.30. OWM also provided written comments on this item.

The submitter of the original GEN 19.1 provided the following:

Over the last several years, there have been, and still are, proposals to recognize some types of meters as either transfer standards or as field standards. Handbook 44 already recognizes the use of many different types of master meters, other reference materials, or devices as transfer standards. This proposal is based upon the existing recognition and permitted use of transfer standards that are already in Handbook 44.

However, there is no common understanding among industry and weights and measures officials as to what distinguishes a field standard from a transfer standard. Consequently, changes are proposed to the Fundamental Considerations Section 3.2. and definitions are proposed for field standards and transfer standards to highlight the critical differences between these two types of standards. Any artifact, reference material or measuring device that meets the requirements of accuracy and repeatability as specified in Section 3.2. of the Handbook 44 Fundamental Considerations qualifies as a field standard. However, what has not been clearly understood is that **the field standard must meet Section 3.2. over the environmental and operational parameters in**

which the commercial measuring devices under test are used. The ranges for these environmental and operational parameters may be very large and include:

- The range of flow rates at which the commercial meters under test operate (from the minimum to maximum flow rates for the meters);
- The range of air temperatures over which meters are used (perhaps 10° F to 105° F);
- The range of product temperatures over which meters are used (perhaps 10° F to 105° F, especially applicable for above ground storage tanks);
- The range of temperature differences that may exist between the product, the standard and the air over which meters are used (perhaps up to 50° F, especially for cold fuel in underground tanks and hot air temperatures);
- The range of pressures at which the pumping systems operate at different times and locations;
- The different products measured by similar meters; and
- Tests of multiple "standards" of the same type when used in different test system configurations (and "standards" of different sizes) to verify that the results agree and are consistent.

A range of environmental and operational parameters over which a transfer standard must meet the accuracy and repeatability requirements are more limited, that is, a transfer standard need only be accurate and repeatable over the conditions that exist for the "short" time that the transfer standard is used. Transfer standards may be tested before and after use to verify a commercial measuring device, so the range of conditions in which accuracy and repeatability may be relatively small. The transfer standard is only required to be accurate and repeatable during the time it is in use, which might be to test only one commercial device. For example:

- The range of flow rates at which the meters under test operate **at the time of the test**;
- The range of air temperatures that exist **at the time of the test**;
- The range of product temperatures that exist **at the time of the test**;
- The range of temperature differences that may exist between the product, the standard and the air **at the time of the test**;
- The range of pressures at which the pumping systems operate **at the time of the test**; and
- The product being measured by the meter **at the time of the test**.

A critical issue that has not be adequately addressed and defined is, "How long must a field standard remain valid (i.e., accurate and repeatable)?" Common sense dictates that the field standard must remain valid over an extended period of time. Transfer standards need only remain valid during their "short" period of use. Because (1) there are some many different types of field standards used to test commercial measuring devices, (2) there are so many transfer standards recognized in Handbook 44, and (3) the applications vary greatly, it isn't clear that a common minimum time period for field standards or for transfer standards can be established. Nevertheless, field standards must be valid and stable over long time periods and wide ranges of environmental and operational parameters as compared to transfer standards.

Additionally, transfer standards do not have to meet the one-third requirement for the uncertainty associated with its performance. Consequently, Handbook 44 typically specifies that the basic tolerances to be applied to the device under test be increased by two times the standard deviation of the transfer standard. This presumes that the transfer standard has been adjusted to have "zero error" or corrections are used to address any significant systematic errors in the transfer standard. This also applies when field standards are used. "The reason for this requirement is to give the device being tested as nearly as practicable the full benefit of its own tolerance."[1]

The submitter also provided the following possible opposing arguments:

[1] Handbook 44, Fundamental Considerations, Section 3.2.

I. There are several proposals before the S&T Committee to recognize some meters as field standards and field standard reference meters. These proposals have not specified how the proposed field standards are to be tested to demonstrate compliance with the Fundamental Considerations requirements of Section. 3.2. It is possible that some companies will push for the recognition of meters as field standards without submitting data to support their claims of performance as field standards.

II. It is very difficult, time consuming and expensive to test meters that are proposed for use as field standards, especially to test using different fuels over the range of temperatures that exist for commercial applications and for temperature differences between the fuel and the air. It is possible that some will object to having to prove meter performance over the range of environmental and operational parameters.

III. It is possible that some companies will want to use performance data collected under laboratory conditions as being indicative of the expected performance of the meters under field conditions.

IV. Laboratory calibration procedures may not reflect the performance of the proposed field standard under field conditions.

V. Some companies may object to the cost of collecting data for transfer standards (meters) of different sizes and with different flow rate ranges to prove that the results for the different sized transfer standards (metering systems) will produce consistent test results on the same commercial meters.

VI. Establishing a reasonably good estimate of the standard deviation associated with a transfer standard (to be added to the basic tolerances for the devices under test) may require significant time, effort and cost.

VII. Some companies may want to modify the device under test to be able to test the commercial measuring device, rather than testing the device as used.

The submitter states that these items are fully developed and requested that this be a Voting Item in 2022.

Background and Discussion for Item OTH-22.1 originally submitted by NIST Office of Weights and Measures.

Source:
NIST, Office of Weights and Measures

Previous Action:
New

Original Justification:

Footnote 2 of Handbook 44, Appendix A, Fundamental Considerations, Section 3. Testing Apparatus was added to:

(1) specify recommendations for suitable field test standards;
(2) require that field test standards meet specifications in Handbook 105 Series or other appropriate documentary standards; and
(3) note that guidance may be obtained from NIST OWM regarding appropriate specifications, tolerances, and other criteria for assessing the suitability of a field test standard for use in inspecting and testing commercial weighing and measuring equipment.

Footnote 2 also recognizes that the Director has the authority to approve additional field test standards and/or equipment beyond those recommended by NIST or specified in a Handbook 105 or other documentary standard. NIST OWM periodically receives inquiries regarding the use of various types of test equipment and test methods. OWM has worked with state weights and measures programs and industry to develop standards and procedures and recommendations on the use of such equipment/methods and, in some cases this has resulted in a specific recommendation or Handbook 105. However, as recognized, in Footnote 2, this does not

preclude the Director from approving equipment for which a specific Handbook 105 or other documentary standard does not exist.

In order to be considered suitable for use in official testing of a commercial weighing or measuring device, field test standards and procedures need to meet a list of what is often referred to as the "Essential Elements of Traceability." This list includes elements outlined in NIST IR6969 GMP-13 Good Measurement Practice for Ensuring Metrological Traceability shown above in the proposed Section 3.1.1. Essential Elements of Traceability. Provided steps are taken to ensure that a given field test standard has been demonstrated to meet the requirements in these elements, it is appropriate for that field test standard to be used in the official inspection and testing of a commercial weighing or measuring device or for use by a service company in testing and placing a device back into service after service work.

While Footnote 2 already provides a statement regarding the authority of the Director to approve such equipment, OWM believes including additional information regarding the essential elements of traceability and a reference to specific measurement practices would be helpful to both emphasize that authority and provide guidance to Directors and industry regarding the selection of appropriate field test standards.

NIST OWM recommends the guidance originally included in Footnote 2 along with the additional references to the "Essential Elements" described above are best included in the body of Section 3 for clarity and ease of use. Consequently, OWM recommends deleting the existing Footnote 2 and incorporating its contents into the body of Section 3.

OWM also believes that some may erroneously believe that field test standards must be specifically listed within a NIST Handbook 44 code in order to be used in the inspection and testing of devices covered by that code. Providing a clear statement that this is not the case along with a reference to the required criteria may help alleviate this misunderstanding.

The submitter acknowledges that Footnote 2 already provides a clear statement that the Director has authority to approve standards which are not addressed by a NIST Handbook 105 Series handbook. Some might argue that the proposed inclusion of additional information and guidance is not necessary.

The submitter states that these items are fully developed and requested that this be a Voting Item in 2022.

Additional Justification for the Formula in the Proposed G-T.5.

Assessment of the 2/3 Formula and the OIML "Reduced MPE" Formula

The 2/3 Formula: Increased MPE = (2/3 x MPE + U) with an upper limit of U_{MAX} = 2/3 MPE

OIML Formula: Reduced MPE = (4/3 × MPE – *U*)

Note: The general term "standard" is used in this paper to address both field standards and transfer standards. The specific terms "field standard" and "Type 2 transfer standard" (T2TS) distinguish between these two types of standards according to the proposed definitions submitted to the NCWM by Seraphin. Type 1 transfer standards (T1TS) are not addressed in this paper.

Based on the results of a discussion between one of the submitters (Seraphin) and Marc Buttler, Emerson - Micro Motion, the submitters agreed to recommend the 2/3 formula for use rather than the OIML formula. However, it is essential that an upper limit be established on the uncertainty associated with a Type 2 transfer standard (abbreviated as T2TS). The submitters agreed to recommend this upper limit not exceed 2/3 of the MPE of the commercial device under test. The same limit should be used if the OIML formula is used.

The OIML formula and the 2/3 formula are similar, but they take different approaches to establish the tolerances for the device under test. The 2/3 formula is more logical, more technically consistent with the Handbook 44 concept of Type 2 transfer standards, and it is easier to understand. The 2/3 formula combines the tolerance that remains to be used by the commercial device with the growing uncertainty of the T2TS into one total tolerance value, whereas the OIML Reduced MPE calculates only the tolerance applied to test of the

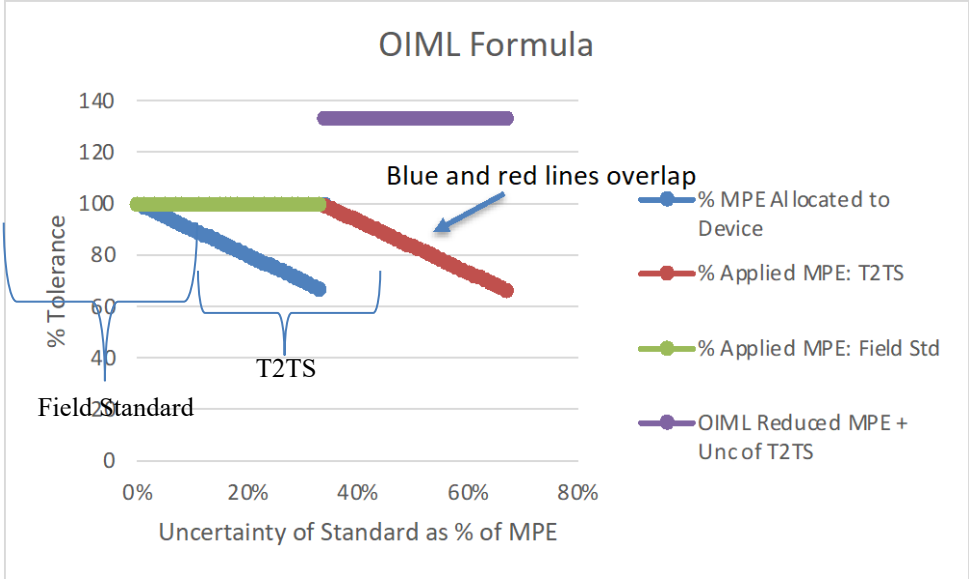
commercial meter under test. When Type 2 transfer standards are used in the field, the uncertainties associated with the T2TS should be recorded on the report form or a copy of the calibration certificate should be left with the test report, so the uncertainty values are available on site and can be used in an analysis should the tests with another T2TS generate different results.

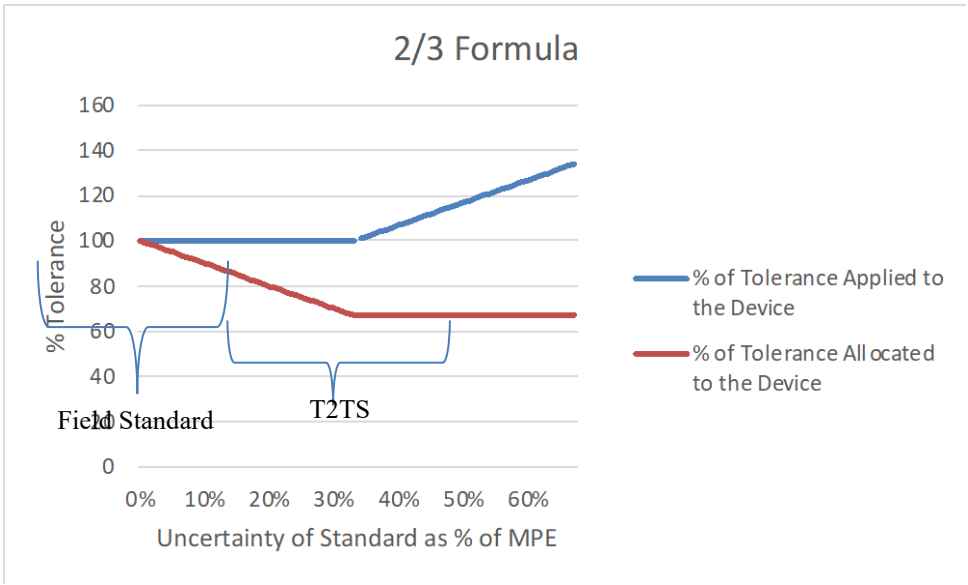
The most accurate reference standard that is available should always be used for any field test. However, when the only practical option for a field test that is available is a Type 2 transfer standard, the 2/3 formula will err in favor of the commercial device to avoid failing a device that should have passed. Conversely, the OIML Reduced MPE might result in failing a commercial device that would have passed had a more accurate (e.g., Type 1 transfer or field) reference standard been available to use for the test.

Conclusion

Field standards are intended to have an error and uncertainty less than or equal to 1/3 of the tolerance applied to the commercial device under test. When a Type 2 transfer standard has an uncertainty slightly greater than 1/3 of the tolerance, then, using the 2/3 formula, the total tolerance applied to the device under test increases above the H44 tolerance by the amount that the uncertainty associated with the Type 2 transfer standard exceeds the 1/3 limit, thereby establishing a total tolerance slightly greater than the H44 tolerances specified in the applicable codes and keeping the portion of the tolerance that remains allocated to the device under test at a constant level equal to 2/3 of the H44 tolerance. When the uncertainty for the Type 2 transfer standard exceeds 1/3 of the MPE, the OIML formula resets the "Reduced MPE" (applied tolerance) to 100% of the MPE. As the uncertainty of the Type 2 transfer standard gets larger and larger, the tolerance allocated to the device under test (e.g., a meter since OIML R117 applies to meters) gets smaller and smaller, to the extent that it is not realistic to use a T2TS to test a commercial meter, because the uncertainty of the T2TS uses up most of the device tolerance. The 2/3 formula is consistent with (but actually smaller than) the usual H44 tolerances that state that the basic tolerances are to be increased by two standard deviations when using a T2TS. Note that with a U_{MAX} of 2/3 MPE for the maximum uncertainty of the T2TS, the applied tolerance associated with the field test result using the 2/3 formula never exceeds 1.33 of the original H44 tolerance for the device under test. The submitters note that, while these principles and associated formula were established to apply to metering systems, the concepts can apply equally to other types of commercial weighing and measuring equipment.

The 2/3 formula specifies the total uncertainty as the device tolerance when a T2TS is used. The OIML formula generates only the tolerance applied to the meter under test when a T2TS is used. The OIML formula is designed to keep the **combined** Reduced MPE value plus the uncertainty associated with the T2TS equal to 1.33 MPE. The OIML formula should also have an upper limit for the uncertainty of the T2TS as well, which should be U_{MAX} of 2/3 MPE. Note that when there is an upper limit of 2/3 the MPE, then the OIML formula always has a tolerance (applied MPE or the Reduced MPE) that is greater than or equal to 2/3 of the original MPE. The OIML Reduced MPE is the tolerance applied to the reading of the meter under test compared to the reading of the T2TS. Consequently, the use of the Reduced MPE with a T2TS is a meter-to-meter or device-to-device tolerance.





The error in the device under test is determined as the difference between the indication of the device under test compared with the value represented or measured by the standard (usually presumed to have zero error or corrections are used for any errors in the standard).

The increase in the applied tolerance when using a Type 2 transfer standard applies only to the basic tolerances for devices as defined in Handbook 44, i.e., acceptance, maintenance and minimum tolerances.[2] Note that the repeatability tolerance and the special test tolerances are NOT increased. [Note that the definition should apply

[2] **basic tolerances.** – Tolerances on underregistration and on overregistration, or in excess and in deficiency, that are established by a particular code for a particular device under all normal tests, whether maintenance or acceptance. Basic tolerances include minimum tolerance values when these are specified. Special tolerances, identified as such and pertaining to special tests, are not basic tolerances. [2.20, 2.22., 3.34, 3.38, 4.42, 5.54]

to all codes, not just those listed with the definition, which do not include all codes that refer to basic tolerances.]

Explanation and Assessment

Field Standards: Uncertainty is Part of the Tolerance

Under the Fundamental Considerations, the correction and uncertainty of field standards are not to exceed 1/3 of the tolerance for the device under test. Under this condition, field standards are considered to be known values and the H44 tolerance is applied to the device under test without any consideration for the uncertainty associated with the field standard. The uncertainty associated with field standards may vary from nearly zero relative to the tolerance for the device under test up to 1/3 of the tolerance for the device under test. Even though the field standard may have an uncertainty as large as 1/3 of the tolerance applied to the device under test, the tolerance specified in H44 for the device is applied without consideration for the uncertainty associated with the field standard. The objective of this limit on the uncertainty associated with field standards "…is to give the device being tested as nearly as practicable the full benefit of its own tolerance."[3] Once the uncertainty associated with a "standard" exceeds the 1/3 limit, the "standard" no longer qualifies as a field standard, but is a Type 2 transfer standard under Seraphin's proposed definitions.

Type 2 Transfer Standards: Uncertainty is Added to the Tolerance

When the uncertainty associated with a T2TS exceeds 1/3 of the tolerance applied to the device under test, the uncertainty of the T2TS is recognized in the field test result by increasing the tolerance that is applied to the device under test. The OIML formula and the 2/3 formula take different approaches to increasing the tolerance for the device under test.

	Field Standard	Field Standard	OIML Formula	OIML Formula	2/3 Formula	2/3 Formula
Uncertainty of Standard (as % of Tolerance)	% of MPE (Tolerance) Applied to the Device	% MPE (Tolerance) Allocated to Device	% of MPE Applied to the Difference in the Test Results Using a T2TS	OIML Reduced MPE and Uncertainty of T2TS (%)	**% of Combined Tolerance and Uncertainty Applied to the Device**	**% of Combined Tolerance and Uncertainty Allocated to the Device**
0%	100	100				
10%	100	90				
20%	100	80				
30%	100	70				
33%	100	67				
34%			99	133	**101**	**67**
40%			93	133	107	67
50%			83	133	117	67
60%			73	133	127	67
67%			67	133	133	67
70%			63	133	137	67
80%			53	133	147	67
90%			43	133	157	67
100%			33	133	167	67

[3] Handbook 44, Fundamental Considerations, Section 3.2

The OIML formula increases the tolerance applied to the device under test by 1/3 minus the uncertainty of the T2TS as soon as the uncertainty of the Type 2 transfer standard exceeds the 1/3 limit. This increase recognizes the uncertainty that is up to 1/3 of the tolerance for field standards. Hence, the tolerance applied to the device under test plus the uncertainty of the T2TS is 1.33 times the original MPE when the uncertainty of the Type 2 transfer standard exceeds 1/3 of the MPE. As the uncertainty of the Type 2 transfer standard increases, the portion of the MPE allocated to the meter under test for the field test result decreases. If the uncertainty of the Type 2 transfer standard becomes very large, the poor accuracy and/or poor repeatability of Type 2 transfer standard makes its use ineffective.

In the 2/3 approach, the formula starts with 2/3 of the device tolerance (i.e., the MPE) apportioned to the device under test, which is the situation when the uncertainty of a field standard is exactly equal to 1/3 of the device tolerance. Next, the uncertainty associated with the T2TS is added to the 2/3 of the original MPE. Consequently, the tolerance (i.e., the MPE) applied to the field test gradually increases by the same amount as the uncertainty for the Type 2 transfer standard increases above the 1/3 level of the original MPE. An upper limit for the uncertainty of the T2TS is proposed to be 2/3 of the MPE, so that the uncertainty does not increase without limit and become meaningless. Hence, the tolerance applied to the device under test, when a T2TS has an uncertainty at the upper limit of 2/3 the MPE, the total tolerance plus the uncertainty will be 1.33 times the original MPE, which is equal to the maximum allowed by the OIML formula for the Reduced MPE plus the uncertainty of the T2TS when the uncertainty of the T2TS just exceeds the 1/3 limit.

The Impact of Large Uncertainties for Field and Transfer Standards

When different standards are used to test the same commercial devices, there is the possibility that the results will not agree exactly. As the uncertainties associated with the field or Type 2 transfer standards increase, then the probability increases that the field test results will not agree or even agree within tolerance. The concern is that some commercial devices could be tested with one standard and pass (or fail) the field tests, but, when tested with a different standard, some commercial devices would fail (or pass) the field tests. Consequently, it is important to keep the uncertainties associated with the standards used to test commercial devices as small as reasonably possible, so that the probabilities of getting different field test results when using different standards are reduced.

Regional Associations' Comments on GEN-19.1:
WWMA 2021 Annual Meeting: Marc Buttler (Emerson Micro Motion): Regards to the fine work of the workgroup and authors of form 15, he finds it useful and helpful by augmenting the existing wording to add clarity as we work forward to more practical testing. He wanted to comment on whether the underlying principle of affording additional tolerance not capable of meeting the 1/3rd. In the language there is an equation (lower down in the proposal) reduced MPE. This is intended to penalize the tolerance of the device and not give additional leeway. Further into the justification it references an established principle that says that additional tolerance is afforded when complex. A better equation would be to take the MPE x 2/3 PLUS and not minus. This avoids jurisdictions having different uncertainty testing to different tolerances. He can prepare a written summary of his comments and will send to us. Bob Murnane (Seraphin): Seraphin proposed this. There is a lack of definitions. This comes into play in block 5. This was put in to clarify and give definite definitions to field and transfer standards. He hopes this clarifies multiple items on the agenda. Russell Vires (Scale Manufactures Association): This item has been around for a while and was part of block 1. It has been pulled out and changed. The SMA has made comments in the past to support this item, but at this point they will meet in November and review; they have not been able to review the substantial changes yet. They have no position as of now. This needs to remain developing to allow stakeholders the opportunity to review.

Diane Lee (NIST OWM): Wants to expand on Russ's comments. This was included in a block with terminology for standards, (master meter, transfer standard or field standard). She questioned whether the transfer standards could meet the 1/3 standard. NIST has an analysis from the annual meeting that will address some of the issues; however, they have not met as a group yet. We can look online on NCWM and look forward to them providing additional info. (Previous analysis is available on the NCWM website).

The WWMA recommended that this be a Developing Item.

SWMA 2021 Annual Meeting: Mr. Henry Oppermann, representing Seraphin, explained the differences between Field Standards, Type 1 and Type 2 Transfer Standards, and expressed support for a proposed change that originated in the Western. Mr. Tim Chesser, State of Arkansas, questioned what "sufficient data" would be once a device is placed into service as a Standard, and how often it would need to be reverified. Mr. Oppermann responded to Mr. Chesser stating that the Master Meter Task Group must evaluate the performance of these devices and create calibration and performance requirements in the future. Russ Vires, Scale Manufacturers Association, stated that they have no position at this time. Russ Vires, Mettler Toledo, stated that he believes this is in conflict with Block 1, and would recommend it continue with a Developing status. Mr. Michael Keilty, Endress + Hauser, assured Mr. Chesser that any devices used as a Field Standard would have a traceable chain of metrology.

The SWMA recommended that this item remain Assigned pending the Workgroup finding a new Chairperson.

CWMA 2022 Annual Meeting: Bob Murnane – Seraphin - Transfer standard is already included in HB44 but it isn't defined.

This doesn't preclude the ability for The Director to approve transfer standards.

HB44 doesn't specify the frequency of testing intervals; cast iron vs stainless steel weights as an example.

G.UR.4.1 already states the owner or operator must maintain the equipment, which includes the accuracy.

States have different interval requirements. Recommends moving to a voting item.

Jan Konijnenburg – NIST OWM - State and industry have a need to use various types of test standards to evaluate commercial devices installed in the marketplace. NIST OWM recognizes the need to use various standards to test commercial devices and support the use of these standards when test data supports its use.

Block 8 clarifies the use and definition of three types of standards to be included in NIST HB 44: (1) Fields Standards, (2) Type 1 Transfer Standards and (3) Type 2 Transfer Standards; it provides an equation that should be used to calculate the tolerances when Type 2 transfer standards are used; provides definitions for Field Standards, Type 1 Transfer Standards and Type 2 Transfer Standards, and provides clarification that the State Director has the authority to approve the use of standard and that specific requirements in NIST HB 44 code are not necessary to approve a standard for use.

Two items, LPG-15.1 and MFM-15.1 in the Interim Meeting Report (Publication 16), include a purpose statement that the proposals are added to allow field standard meters to be used to test and place into service dispensers and delivery system flow meters. Block 8 items clarify what has always been recognized in NIST HB 44 concerning the responsibility for acceptance of a standard and notes that specific code changes are not necessary for a field standard to be adequate for use.

In addition to the changes in Block 8, a new form 15 for the 2023 cycle which is not included in the 2022 Publication 16 and has not been addressed separately in the 2022 NIST OWM Technical Analysis but has been circulated to the Spring 2022 Regional Associations (NEWMA and CWMA)

This new Form 15 adds a General Code requirement so that rather than revising a specific code in Handbook 44 every time a new field or transfer standard is proposed or developed, an overall statement in the General Code recognizes the use of other field and transfer standards that meet the requirements for use as field or transfer standards. The proposal is as follows:

G-N.3. Test Methods. – Permissible test methods for verifying compliance of weighing and measuring systems with the provisions of the General Code and Specific Codes include, but are not limited to, test methods and apparatus that have been approved by the State Director of weights and measures as outlined in Appendix A - Fundamental Considerations, Section 3. Testing Apparatus.

NIST OWM also observed that the definitions in Block 8 should include appropriate references to the NIST HB 44 codes.

OWM Recommendation: The submitters agree that these items, GEN-19.1 and OTH-22.1 are fully developed and requested that this S&T committee consider that Block 8 item be a Voting Item in 2023.

Charlie Stutesman – KS – GEN-19.1 line 29 – strike "as determined by the Director"
"short term" and "extended term" are ambiguous phrases.

Loren Minich – KS – Page 277 line 41 regarding a Type 2 transfer standard not being stable or valid over extended time, but OTH-22.1 page 279 line 28 says the Type 2 standard must be stable and valid. Mr. Minich would like to keep as developing.

Doug Musick – KS - Page 277 definitions: having the 1/3 rule in the code (and not in an appendix) is helpful. Suggested that Type 2 should go away and just have a single "transfer standard" definition.

Michael Keilty – Endress+Hauser – "Short term", "extended period of time", "short period of time", "stable", "valid" are arbitrary; who defines this? Who is going to establish this time period and qualifications of devices? Are we establishing a program for that? API chapter 4.8 dictates 5 year calibration intervals for small volume provers, for example.
Additional letters, presentation and data may have been submitted for consideration with this item. Please refer to https://www.ncwm.com/publication-15 to review these documents.

The CWMA S&T Committee recommends this moves forward as a voting item.

NEWMA 2021 Interim Meeting: Mr. Bob Murnane (Seraphin) commented that the purpose of this proposal was to define Type 1 and Type 2 Transfer Standards. Originally the proposal had the OIML formula, but the formula only calculates the meter-to-meter tolerance and as the uncertainty associated with the transfer standard increases, the tolerance allocated to the commercial device gradually decreases. The submitter is now proposing a "2/3 Formula" where the calculation includes all the uncertainty associated with the transfer standard and the tolerance allocated to the commercial meter never drops below 2/3 of the normal tolerance. Mr. Murnane requested that this proposal be given a voting status.

After hearing comments from the floor, the committee recognized the need to further develop this block and recommended the block retain developing status.

Discussion:

This item was placed on the meeting agenda at the request of the sector members. The item is added for discussion only. This meeting is the perfect opportunity to discuss S&T Committee agenda items, however, the discussion will not be documented in the sector meeting summary.

9. General Discussion Regarding S&T Committee Agenda Item VTM-18.1

Source: S&T Committee Agenda from Pub 15 for the 2023 NCWM Interim Meeting

Source: New York and NIST OWM (Carryover from 2018, VTM 1-B) and Murray Equipment, Inc., Total Control Systems

Purpose:
Provide specifications and user requirements for manifold flush systems on a multiple-product, single-discharge hose. Recognize that there is a balance between a mechanism that provides an important safety benefit but also, if used incorrectly, facilitates fraud. Ensure that VTM owners understand their responsibilities when installing such a system and ensure uniformity in enforcement throughout the country and clarify the paragraph to protect vehicle

motor fuel quality, retain safe operating procedures when handling vehicle motor fuels, and to prevent fraud during delivery of vehicle motor fuels from vehicle tank meters.

Item Under Consideration:

Amend Handbook 44, Vehicle-Tank Meters Code as follows:

S.3.1. Diversion of Measured Liquid. – No means shall be provided by which any measured liquid can be diverted from the measuring chamber of the meter or the discharge line thereof. However, two or more delivery outlets may be installed if means are provided to ensure that:

(a) liquid can flow from only one such outlet at one time; and

(b) the direction of flow for which the mechanism may be set at any time is definitely and conspicuously indicated.

This paragraph does not apply to the following:

(1) Equipment used exclusively for fueling aircraft.

(2) Multiple-product, single-discharge hose metering systems that are equipped with systems designed to flush the discharge hose, provided the flushing system complies with the provisions of paragraph S.3.1.1. Means for Clearing the Discharge Hose**, Multiple-Product, Single-Discharge Hose Metering Systems.**

(Amended 2018 **and 20XX**)

S.3.1.1. Means for Clearing the Discharge Hose, Multiple-Product, Single-Discharge Hose Metering Systems. - Multiple-product, single-discharge hose ~~M~~metering systems may be equipped with systems specifically designed to facilitate clearing of the discharge hose prior to delivery to avoid product contamination. In such systems. a valve to temporarily divert product from the measuring chamber of the meter to a storage tank, shall be installed only if all the following are met:

(a) the discharge hose remains of the wet-hose type;

(b) the valve and associated piping are approved by the weights and measures authority having jurisdiction over the device prior to commercial use;

(c) the valve is permanently marked with its purpose (e.g. flush valve);

(d) the valve is installed in a conspicuous manner and as far from the hose reel as practical;

(e) the system clearly and automatically indicates the direction of product flow during operation of the flush system; and

(f) clear means, such as an indicator light or audible alarm, is used to identify when the valve is in use on both quantity indications and any associated recorded representations (e.g., using such terms as "flushing mode" or "not for commercial use");

[nonretroactive as of January 1, 2024.]

(g) effective, automatic means shall be provided to prevent passage of liquid through any such flush system during normal operation of the measuring system; and

[nonretroactive as of January 1, 2024.]

(h) no hoses or piping are connected to the inlet when it is not in use.

(Added 2018)**(Amended 20XX)**

UR.2.6. Clearing the Discharge Hose.

UR.2.6.1. Clearing the Discharge Hose, General. – A manifold flush or similar system designed to accommodate the flushing of product on single-hose, multiple-product systems is not to be used during a commercial transaction. The following restrictions apply:

a) The inlet valves for the system are not to be connected to any hose or piping (dust covers are permitted) when not in use.

b) When the flushing system is in operation, the discharge hose is only to be connected to the port for the product type being flushed from the discharge line.

c) Following the flushing process, indications and recording elements must be reset to zero prior to beginning a commercial delivery.

(Added 20XX)

UR.2.6.2. Minimizing Cross Contamination. – When dissimilar products are dispensed through a single meter, the user shall take steps to ensure the system is properly flushed to minimize the potential for cross contamination of product in receiving tanks on subsequent deliveries. Dispensing products having radically different characteristics (e.g., gasoline and diesel fuel) through a single meter delivery system is not recommended.

(Added 20XX)

UR.2.6.3. Records. Whenever, prior to delivery, a different product is pumped through the discharge hose to avoid contamination, a record including the date, time, original product, new product, and gallons pumped shall be maintained. These records shall be kept for a period of 12 months and available for inspection by the weights and measures authority.

(Added 2018)

Background/Discussion:

This item has been assigned to the submitter for further development. For more information or to provide comment, please contact:

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This item was one of two separate parts of VTM-1 (previously VTM-1A and VTM-1B) considered by the Committee at the 2018 NCWM Annual Meeting. The item voted on at the 2018 Annual Meeting, VTM-1A was adopted and VTM-1B was assigned an Informational status and carried-over to the next cycle.

Manifold flush systems are typically used on VTM's with multiple compartments, delivering multiple products through a single hose. The purpose of the system is to allow the driver a means of clearing the hose of product prior to delivery (e.g., clearing the hose of diesel fuel before delivering clear kerosene). These types of systems are often marketed as a safety feature in that it eliminates the need for the driver to climb on top of the truck to clear the hose. Such systems are also useful in helping avoid cross-contamination. Typically, the driver attaches the nozzle to the manifold and pumps product back into the supply tank via the manifold until the previous product is flushed from the hose. There is often a sight gauge which allows the driver to tell when the product is flushed.

The obvious concern is that this makes it very easy for the driver to circulate product through the meter prior to delivery, which goes against S.3.1. It should be noted that it also goes against S.3.1. when the driver climbs on top of the tanker and clears the hose. The submitter has voiced concerns involving the safety of this practice noting that the operator could be subject to falls from the tanker. The distance between the flush system and the hose reel is also a factor in how easy it is for the driver to facilitate fraud.

Manifold flush systems are available from OEMs and can be found in various catalogs. Looking on multiple websites, these systems are being installed across the country and for some manufacturers seem to be standard equipment for new trucks. The submitter of VTM-1 has also seen these systems installed on trucks that are for sale where the seller notes the system as a selling point. He can foresee these systems being mandated in the future as a safety requirement and would like W&Ms to have a clear policy before that happens.

Another concern is with systems fabricated onsite. These systems are often difficult to distinguish and installed in an inconspicuous manner. While the submitter of VTM-1 has ordered many of these systems out-of-service until repaired, it can be frustrating for the owner because the truck was used in another state for years and approved by weights and measures jurisdiction in the other state. This lack of uniformity is problematic for both officials and private industry.

NCWM 2018 Annual Meeting: The Committee heard comments from OWM that this item needed additional work to address concerns that had been identified in OWM's 2018 Interim Meeting (and earlier) analyses. While there are clear benefits to improving safety when flushing hoses, OWM and others have noted these systems can facilitate fraud without appropriate safeguards in place. OWM noted the language in the Item Under Consideration in the Committee's 2018 Interim Report would:

1. provide an (unintentional) exemption to the provisions for "diversion of product" for all single meter, multiple product, multiple compartment systems;
2. would (unintentionally) require all such systems to be equipped with a manifold flush system;
3. fail to include requirements for the system to clearly indicate (on both display and recorded representations) when the flush system is in operation; and
4. fail to include limitations on how the user is permitted to appropriately use these systems.

In discussing the changes OWM felt were needed prior to the Annual Meeting, the submitter and OWM agreed that some of OWM's proposed changes would be considered editorial and others technical in nature. Since other than editorial changes could affect the Voting status of the item, OWM offered the following two courses of action for the Committee to consider:

1. Downgrade the item to Informational to allow time to address all the changes that are needed; or
2. Split the item into two parts to allow the portion of the item needing only editorial changes to move forward for vote; and carryover the remaining portion to allow time for it to be further developed and considered during the next NCWM cycle.

Rather than hold up the entire item to be considered in the next Conference cycle, the submitter requested the item be split into two parts to allow the completed portion, including the editorial changes, to move forward for vote.

<u>NCWM 2019 Interim Meeting:</u> The Committee heard comments to Agenda Item VTM-1 as well as position statements from MMA that they objected to manifold flush systems. NIST OWM provided an analysis to the Committee prior to the Interim Meeting. The comments heard during the open hearing and/or received prior to the Interim meeting are summarized below:

Mr. Hal Prince (FL) stated that it was missing any inclusion for limitation of use, such as when delivering multiple products. Mr. Prince suggested that the Committee consider language forwarded by the SWMA in its 2018 Annual Report. Mr. Prince also suggested that the item be kept developmental. Mr. Dan Murray (Murray Equipment, Total Controls System) stated that Manifold Flush Systems were a big problem in Europe where they are permitted. Mr. Murray suggested these systems could facilitate fraud and NTEP should carefully consider this before granting approval. These systems should also be sealed. Mr. Murray's opinion was that the item should be withdrawn. Mr. Dmitri Karimov speaking on behalf of Meter Manufacturers Association, stated that MMA objected to manifold flush systems.

NIST OWM agreed with the WWMA and the CWMA that this item is fully developed and agreed with assigning it a voting status. OWM provided the following review of the operation of the equipment, proposed changes, and additional points to consider:

- At the 2018 NCWM Annual Meeting the Conference voted to allow an exemption to S.3.1. for Manifold Flush Systems, which is currently in the 2019 HB 44 VTM code.
- S.3.1. states "no means" shall be provided to divert liquid from the measuring chamber of the meter or the discharge line.
- A manifold flush system allows liquid to be diverted from the discharge line on single hose multi-compartment VTMs so that liquid of one product is not mixed with liquid of another in the discharge line.
- Without a manifold flush system, the operator must manually return the product to the correct compartment to clear the discharge line before using another product.
- There are safety hazards with manually returning the product to storage (operator climbing on top of tank and lifting hose to return the product. There are also safety concerns when not properly clearing the discharge lines prior to delivering a different product and because of these safety concerns it was reported that more of these systems will likely be installed on single hose multicompartment trucks.
- Although safety is a high priority, the "means" used to return product back to storage is not as visible and makes facilitation of fraud a high possibility.
- The additional changes proposed are intended to ensure such systems are designed such that they do not facilitate fraud; help ensure owners understand their responsibilities when installing such a system; and ensure uniformity in enforcement though out the country.
- The changes reflect the suggested language from OWM's previous analysis and incorporate comments received from the MMA and others during the 2018 Annual meeting.

Non-retroactive dates may need to be added to allow time for manufacturers of flush systems to incorporate the safeguards into their systems. During the committee's work session, the Committee considered the comments received during the Interim Meeting open hearings and recommended a voting status for this item.

NCWM 2019 Annual Meeting: The Committee supported amendments proposed to subparts (f) and (g) based upon statements from the submitter (NY) indicating that manufacturers of manifold flush systems will need additional time to incorporate the safeguards into their systems. The Committee also agreed to place the item on the voting consent calendar as amended, and as shown in the Item Under Consideration.

During the open hearing sessions, the Committee heard comments from NIST OWM's Mrs. Tina Butcher offering a revision of S.3.1.1.(f). suggesting this portion be split into separate bullet points. Also heard were comments from Mr. Jim Willis (NY) in support of NIST OWM's suggestion and his recommendation for making this a nonretroactive requirement to allow manufacturers time to accommodate the necessary changes.

During the voting session, it was requested this item be removed from the voting consent calendar and voted on separately. The item failed to receive enough votes for adoption and was therefore returned to the Committee.

NCWM 2020 Interim Meeting: The Committee heard from Ms. Butcher (NIST OWM) who recommended that VTM-18.1 and VTM-20.1 be combined because both items address manifold flush systems, but VTM 18-1 does not restrict the use of the system to certain products and VTM 20-1 restricts the use of the system to home heating fuel. Mrs. Butcher recommended that the combined item be given a developing status to address the design and use of these systems adequately. Mrs. Butcher also recommended improvements to VTM 18-1 and VTM 20-1.

Mr. Dmitri Karimov (MMA) agreed with the language proposed in VTM 18-1 and acknowledged that there is value in the alternative proposal VTM-20.1 and supports combining both proposals into one. Mr. Hal Prince (FL) also agreed that Item VTM-18.1 and VTM-20.1 be combined and given a developing status. Mr. Prince expressed a willingness to work with submitters to further develop the items and noted that he has concerns with cross-contamination caused by these systems. Mr. Jim Willis agreed with Mrs. Butcher's statements. Mr. Karimov recommended including more categories for types of fuels in the proposal is important such as flammable, explosive, etc. Mr. John Hathaway (Murray Equipment) submitter of VTM-20.1 expressed interest in working together with the submitters of VTM-18.1.

During the Committee's work session, the committee agreed that this item, VTM-18.1 should be combined with VTM-20.1 and be given a developing status to allow the submitters of both items to work together towards resolving the conflicts in these two items.

NCWM 2020 Annual Meeting: Due to the 2020 Covid-19 pandemic, this meeting was adjourned to January 2021, at which time it was held as a virtual meeting. Due to constraint of time, only those items designated as 2020 Voting Items were addressed. All other items were addressed in the subsequent 2021 NCWM Interim Meeting.

NCWM 2021 Interim Meeting: The Committee heard from Mr. Mike Smith (NY) who supports VTM 18.1 as a Developing item and he agreed to work with the other submitters of this item on paragraphs S.3.1.1. (f) and (g) and to address contamination. Mr. Hal Prince (FL) supports a Developing status for VTM-18.1 and noted that with VTM-18.1 there will be issues with fuel contamination. The concern raised in previous discussions was that if these manifold systems are used with multi-product, single discharge hose dispensers for the delivery of both motor fuels and home heating fuels, a small amount of home heating fuel mixed with a motor fuel could be problematic. It was also noted that these fuels could get contaminated repeatedly whenever there is a change from one fuel to another and that there is also the safety issue of flashing when mixing a gasoline with diesel or kerosene. Ms. Diane Lee report that VTM-18.1 and VTM-20.1 conflict. VTM-20.1 restricts the use of these systems to be used with only home heating fuels. Dmitri Karimov (MMA) noted if VTM-18.1 is adopted then VTM-20.1 would not be required. Mr. Charles Stutesman, (KS) was not sure if VTM-18-1 and VTM-20-1 were being discussed together and it was pointed out that it was agreed that they be combined at the 2020 interim meeting. Mr. John Hathaway (Total Control Systems) agreed with a Developing status for this item and noted that the changes to Paragraphs (f) and (g) would help to address some of the issues that were raised. The committee agreed to a Developing status for VTM-18.1 and to Withdraw VTM-20.1. The committee also stated that any concerns with contamination and safety should also be addressed.

NCWM 2021 Annual Meeting: Mr. Jim Willis (NY, submitter) reported that there are no updates due to the pandemic and requested that it remain under Developing status. NIST OWM included written comments in its analysis.

NCWM 2022 Interim Meeting:

Item under consideration presented to 2022 NCWM Interim meeting as:

S.3.1. Diversion of Measured Liquid. – No means shall be provided by which any measured liquid can be diverted from the measuring chamber of the meter or the discharge line thereof. However, two or more delivery outlets may be installed if means are provided to ensure that:

(b) liquid can flow from only one such outlet at one time; and

(b) the direction of flow for which the mechanism may be set at any time is definitely and conspicuously indicated.

This paragraph does not apply to the following:

(2) Equipment used exclusively for fueling aircraft.

(2) Multiple-product, single-discharge hose metering systems that are equipped with systems designed to flush the discharge hose, provided the flushing system complies with the provisions of paragraph S.3.1.1. Means for Clearing the Discharge Hose**, Multiple-Product, Single-Discharge Hose Metering Systems.**

(Amended 2018 **and 20XX**)

S.3.1.1. Means for Clearing the Discharge Hose, Multiple-Product, Single-Discharge Hose Metering Systems. - Multiple-product, single-discharge hose ~~M~~metering systems may be equipped with systems specifically designed to facilitate clearing of the discharge hose prior to delivery to avoid product contamination. In such systems. a valve to temporarily divert product from the measuring chamber of the meter to a storage tank, shall be installed only if all the following are met:

(i) the discharge hose remains of the wet-hose type;

(j) the valve and associated piping are approved by the weights and measures authority having jurisdiction over the device prior to commercial use;

(k) the valve is permanently marked with its purpose (e.g. flush valve);

(l) the valve is installed in a conspicuous manner and as far from the hose reel as practical;

(m) the system clearly and automatically indicates the direction of product flow during operation of the flush system; and

(n) clear means, such as an indicator light or audible alarm, is used to identify when the valve is in *use* **on both quantity indications and any associated recorded representations (e.g., using such terms as "flushing mode" or "not for commercial use");**

[nonretroactive as of January 1, 2024.]

(o) effective, automatic means shall be provided to prevent passage of liquid through any such flush system during normal operation of the measuring system; and

[nonretroactive as of January 1, 2024.]

(p) no hoses or piping are connected to the inlet when it is not in use.

(Added 2018)**(Amended 20XX)**

UR.2.6. Clearing the Discharge Hose.

UR.2.6.1. **Clearing the Discharge Hose, General. – A manifold flush or similar system designed to accommodate the flushing of product on single-hose, multiple-product systems is not to be used during a commercial transaction. The following restrictions apply:**

d) The inlet valves for the system are not to be connected to any hose or piping (dust covers are permitted) when not in use.

e) When the flushing system is in operation, the discharge hose is only to be connected to the port for the product type being flushed from the discharge line.

f) Following the flushing process, indications and recording elements must be reset to zero prior to beginning a commercial delivery.

(Added 20XX)

UR.2.6.2. Records. Whenever, prior to delivery, a different product is pumped through the discharge hose to avoid contamination, a record including the date, time, original product, new product, and gallons pumped shall be maintained. These records shall be kept for a period of 12 months and available for inspection by the weights and measures authority.
(Added 2018)

The Committee heard from Mr. Jim Willis (NY, submitter) and provided an update that contained amended language with modifications to UR.2.6.2 and creating UR.2.6.3. The amendments were agreed upon by the other joint submitters, NIST OWM and Murray Equipment. He stated that the new proposed language would hold device owners responsible for ensuring there is no cross-contamination of fuels and also allows jurisdictions to prohibit using manifold flush systems or dispensing dissimilar products through a single meter. The Meter Manufacturers Association, Mr. John Hathaway (Murray Equipment), Ms. Cheryl Ayer (NH), and Mr. John McGuire (NJ) also voiced support for the amended language and urged the item be given a voting status. Mr. Hal Prince (FL) opposes the entire item, indicating the use of a single meter to dispense different products is not legal in his state and has concerns of cross-contamination of fuel. During the Committee work session, the committee assigned this item a voting status with the amended language seen above as the item under consideration. The item as presented to the 2022 NCWM interim meeting can be seen below the item under consideration.

NCWM 2022 Annual Meeting: The Committee heard comments on the item as printed in Publication 16 and introduces during the NCWM 2022 Interim meeting.

Mr. Dmitri Karimov spoke on behalf of the MMA in support of the item, as its helps minimize fraudulent activities and increase safety for operators.

Mrs. Tina Butcher of NIST OWM, as one of the submitters of the item expressed support as a voting item. She commented the item has undergone a significant amount of work in the past two cycles, collaboration with NIST OWM, Murray Equipment, and the state of New York to address previous concerns. Mrs. Butcher added the item addresses safeguards to prevent product contamination, limit fraud, and adds distinct safety advantages. Mrs. Butcher referred to the written NIST OWM analysis for details. She added this may be a widespread practice in many jurisdictions and this proposal provides requirements to limit fraud during such deliveries. Mrs. Butcher added a reminder that the implementation and enforcement of these requirements can be administered and controlled through jurisdictional legislative means.

Mr. Hal Prince (FL) commented in opposition of the item, noting it is not appropriate for a delivery through a single meter, single hose system where contamination can occur. Mr. Prince was concerned with UR.2.6.2., adding the language is misleading when referring to avoiding contamination, where the act of flushing a meter and hose is introducing contamination. Mr. Prince commented if the item where to pass, he would like to see added language to make clear users of such devices should confirm with the jurisdiction before use.

Mr. Jim Willis (NY) provided comments in support of the item. He referred to these device types currently used by small businesses throughout New York State, noting this would provide a safer method to clear discharge hoses and not require operators to climb on top of the truck to clear discharge hoses. Mr. Willis is in support of the item.

Mr. Charlie Stutesman (KS) commented the item provides a way to address safety concerns by not requiring operators to climb on top of the delivery truck to clear discharge hoses. He also noted the increased number of single meters, single hoses with multi-calibrated capabilities seen in the field and would like to see a way to address these meter types. Mr. Stutesman questioned if existing meter manifolds can be retrofitted to meet these requirements, requesting clarification to address the retroactive versus nonretroactive dates.

Mr. Jon Hathaway (Murray Equipment) commented in support of the item, adding that product contamination is not eliminated, but minimized with these requirements, adding UR.2.6.2. addresses concerns. Mr. Hathaway stated vehicle tank meter manufacturers support and are in agreeance to not have dissimilar fuels metered through a single system. Metering of dissimilar fuels (gasoline v. diesel) is completed through a separate metering system.

Mr. Kevin Schnepp (CA) expressed concern with the terms, “radically different” and “not recommended”, as these terms are not well defined and provide no authority for enforcement. Mr. Schnepp also stated his concerns with the potential for contamination.

Ms. Angela Godwin (San Bernadino County, CA) was concerned with the nonretroactive versus the retroactive status and encourages the consideration of any impact this may have.

Ms. Cheryl Ayer (NH) expressed her support of the item with a retroactive date.

Mr. Jim Willis (NY) offered suggestive language to address concerns about jurisdictional discretion.

The Committee did not recommend any changes to the item as written in Publication 16. The item was assigned a voting status during the NCWM 2022 annual meeting where the item was voted upon and failed to meet the required number of votes by membership. The item was returned to committee.

Regional Associations’ Comments:

WWMA 2021 Annual Meeting: Matt Douglas (California - DMS): California supports further development. Has there been any further development since annual meeting?

The WWMA S&T Committee recommends the status remain Developmental. The Committee recommends that the submitters (NIST, New York and Murray Equipment) continue their work together to further develop the item.

SWMA 2021 Annual Meeting: No comments were received on this item. NIST requests this item remain Developmental.

This committee recommends the status remain Developing at the request of the submitter.

CWMA 202. Annual Meeting: No comments from the floor.

The CWMA S&T Committee recommends this item to remain a voting item.

NEWMA 202, Annual Meeting: Mr. Jim Willis (NY), Mr. John McGuire (NJ), Mr. Ethan Bogren (Westchester County, NY) and Ms. Tina Butcher (NIST OWM) rose in support of the item as voting.

After hearing comments from the floor, the committee considered the item to be fully developed and recommended that the item retains voting status.

Discussion:

This item was placed on the meeting agenda at the request of the sector members. The item is added for discussion only. This meeting is the perfect opportunity to discuss S&T Committee agenda items, however, the discussion will not be documented in the sector meeting summary.

10. General Discussion S&T Committee Item- Block 5

BLOCK 5 ITEMS (B5) TEST DRAFTS

Source:

Murray Equipment, Inc./Total Control Systems.

Purpose:

Change the word "should" to "shall" to clarify the importance of using a calibrated container of adequate size to accept a "test draft of at least the amount delivered by the device in 1 minute at its maximum discharge rate" where it is referenced in Handbook 44 Vehicle-Tank Meters and the Liquid Measuring Devices codes.

B5: LMD-23.2 N.3.5. Wholesale Devices

Item Under Consideration:

Amend Handbook 44, Liquid Measuring Devices Code as follows:

N.3.5. Wholesale Devices. - The delivered quantity ~~**should**~~**shall** be equal to at least the amount delivered by the device in one minute at its maximum discharge rate and shall in no case be less than 200L (50 gal).

B5: VTM-23.2 N.3. Test Drafts

Item Under Consideration:

Amend Handbook 44, Vehicle Tank Meters Code as follows:

N.3. Test Drafts. (VTM Code) – Test drafts ~~**should**~~**shall** be equal to at least the amount delivered by the device in 1 minute at its maximum discharge rate and shall in no case be less than 180 L (50 gal) or 225 kg (500 lb).

Previous Action:
2023: New Items

Original Justification:
In some locations, the largest available prover for fuel field testing is 100 gallons. In high flow situations over 100 gpm, the 100-gallon prover does not meet requirement of HB44. Inspectors are using what they have and doing the best they can. However, using a proving can smaller than what is recommended in HB44 can lead

to errors in the field including failing an accurate metering system that would have been approved if the draft size was the correct size. In fact, we have experienced situations where mechanical registers are favored over electronic registers when smaller than recommended size test drafts are used due to inspectors visually estimating fractions of gallons on a mechanical register that reads out in whole gallons while only reading in whole gallons on electronic registers set to read in whole gallons.

In the following example, there is an aircraft refueler that normally operates at 300 GPM through a standard aircraft underwing fueling nozzle. The inspector is using the over-wing nozzle at 100 GPM in the available 100-gallon proving can to test the system. The customer wants the meter to display in whole gallons due to the high delivery speed and large volume of delivered fuel per transaction when fueling aircraft at 300 GPM. Because the VTM code says the test draft "should" be equal to at least the amount delivered by the device in 1 minute at its maximum discharge rate, the inspector felt comfortable using the 100-gallon proving can rather than securing a 300-gallon or larger proving can.

Besides feeling empowered to use a proving can smaller than the recommended size, the inspector also interpreted the text from N.4.1 Normal Tests. – "...under the conditions of the installation" to mean that the meter display could not be changed to indicate decimal points, but rather must be left on whole gallons. Most likely the meter with electronic display would have passed this "non-normal" test if the display would have been set to tenths or hundredths of gallons for the test draft. The ½ gallon of potential rounding error caused by the whole gallon display introduced an additional system error of up to 0.5% on a 100-gallon prover, which make is nearly impossible to pass a test with +/- 0.2% of allowable error.

In the example above, the inspector set conditions that encouraged high variability in the system accuracy and precision. When questioned about the test draft conditions, the inspector referred to the Handbook 44 code, interpreting it to allow the undersized proving can and not allow meter display decimal changes. Changing Handbook 44 text from "should" to "shall" will prevent undersize test drafts. It is also important to clarify what "…under the conditions of the installation" specifically refers to; that is, the fluid path elements such as hose length, hose type, nozzle setting, system valve settings, etc. Metering systems with electronic digital displays should not be handicapped due to being set for whole gallons or tenths of gallons especially if the proving can used is smaller than what is required or recommended by Handbook 44.

One of the technological advancements of electronic registers over mechanical registers is the option of quickly and easily changing the number of decimal points shown on the display. Something that literally takes seconds to do on an electronic register is cumbersome, time consuming, and generally not recommended outside of a factory on mechanical registers. With very few exceptions, customers, distributers, and manufacturers favor electronic registers due to improved features, improved durability and accuracy. Mechanical registers, on the other hand, are becoming obsolete and should not be given preference due to a misunderstanding of the meaning of the phrase "…under the conditions of the installation."

The submitter acknowledges the following arguments:

1) **Some locations don't have access to calibration containers large enough to hold the required test draft size.** In this case, the correct size calibration container should be borrowed or rented to meet HB44 requirements.
2) **Everything is fine with the current code text, don't change it.** The problem is that everything is NOT fine now. Due to the soft "should" language rather than the un-negotiable "shall" language, inspectors do from time to time use smaller than recommended proving cans that can lead to failing an accurate metering system or approving an inaccurate system.
3) **Inspectors know it is OK to change the decimal points for testing when using a calibration container that is smaller than is recommended.** In the example above, the inspector would NOT allow the decimal points to be changed for testing, so not all inspectors seem to agree.
4) **Inspectors may have to break the calibration seal to change the decimal point settings in some situations**. That is why the inspectors have calibration seals.

Requested Status by Submitter: Not Specified

Discussion:

This item was placed on the meeting agenda at the request of the sector members. The item is added for discussion only. This meeting is the perfect opportunity to discuss S&T Committee agenda items, however, the discussion will not be documented in the sector meeting summary.

Closing Items:

11. Changes in Meeting Documentation Development Process

Source: NTEP Administrator

Background: The responsibility for the development of the meeting agenda and summary documents has changed. Beginning with the 2021 meeting a member of the Measuring Sector, with the help of NTEP personnel, will assume this responsibility. This change is based on direction from the NTEP Committee and the NCWM Board of Directors and aligns the responsibility with the current action of other Sectors, Work Groups, and Task Groups.

The NTEP Administrator will create a meeting summary report, for the 2020 Measuring Sector Meeting and will distribute to the Sector Members, at a later date.

In addition to the assignment of the individual or individuals responsible for these documents, I would encourage the Sector to develop a timeline document to assist the individual in the ability to develop a meeting agenda in a timely manner and with the least impact to their current responsibilities. Due to meeting time constraints, I would offer my assistance to develop this timeline document offline, with the distribution, review, and acceptance of the document to occur within six months from the adjournment of this meeting. A few items to be addressed in this timeline document would include:

1. A deadline for the submittal of new proposals, and reports from subgroups with specific assigned tasks,
2. A deadline for the distribution of the agenda and summary documents.

I would suggest that the timeline document be placed on the Measuring Sector's home page on the NCWM Web Site.

2021 MS Meeting Discussion:

During the 2021 MS Meeting, Michael Keilty (MS Chair) opened the item up for discussion. Darrell Flocken asked that this item is to be put on hold pending the outcome of a similar topic with the standing committee reports. This was followed by some discussion on the need to finalize the outcome of an item before moving on to the next item. A second approach saw suggested that the in-meeting work could consist of listing a series of bullet points to make the creation of the meeting summary easier after the fact.

MS member Marc Buttler volunteered to take on the responsibility under certain meeting style conditions where the summary was finalized before moving on to the next item.

Mr. Keilty declared this item as closed.

2022 MS Meeting Discussion:

12. Meeting Location and Date of 2023 Measuring Sector Meeting

Background: This Item is included on the Sector's agenda to allow for input from Sector members on future meetings and to allow NTEP Administration to apprise the Sector of dates that have already been set.

2022 MS Meeting Discussion:

13. Meeting Attendees

The following individuals participated in the 2022 Measuring Sector meeting.

Measuring Sector Members: