# Specifications and Tolerances (S&T) Committee
# 2018 Interim Meeting Agenda

Ivan Hankins, Committee Chair
Iowa

## INTRODUCTION

The S&T Committee will address the following items in Table A during the Interim Meeting. Table A identifies the agenda items by reference key, title of item, page number and the appendices by appendix designations. The headings and subjects apply to *NIST Handbook 44 Specifications, Tolerances, and Other Technical Requirements for Weighing and Measuring Devices, 2018 Edition*. The first four digits of an item's reference key are assigned from the Subject Series List. The acronyms for organizations and technical terms used throughout the agenda are identified in Table B. In some cases, background information will be provided for an item. The fact that an item appears on the agenda does not mean it will be presented to National Conference on Weights and Measures (NCWM) for a vote. The Committee will review its agenda and may withdraw some items, present some items for information meant for additional study, issue interpretations, or make specific recommendations for change to the publications identified which will be presented for a vote at the Annual Meeting. The Committee may also take up routine or miscellaneous items brought to its attention after the preparation of this document. The Committee may decide to accept items for discussion that are not listed in this document, providing they meet the criteria for exceptions as presented in NCWM Policy 3.1.4. Handbooks, *Procedures to Modify Handbooks*. The Committee has not determined whether the items presented will be Voting or Informational in nature; these determinations will result from their deliberations at the Interim Meeting.

An "Item under Consideration" is a statement of proposal and not necessarily a recommendation of the Committee. Suggested revisions are shown in **bold face print** by **~~striking out~~** information to be deleted and **<u>underlining</u>** information to be added. Requirements that are proposed to be nonretroactive are printed in ***bold faced italics***.

In some cases, there may be proposed changes affecting multiple codes that share the same purpose or proposed changes to one code may be dependent on the adoption of proposed changes to another. The Committee may group such items into "Blocks" to facilitate efficient handling for open hearings and voting. These blocks are identified in Committee's agenda.

All sessions are open to registered attendees of the conference. If the Committee must discuss any issue that involves proprietary information or other confidential material; that portion of the session dealing with the special issue may be closed if (1) the Chairman or, in his absence, the Chairman-Elect approves; (2) the Executive Director is notified; and (3) an announcement of the closed meeting is posted on or near the door to the meeting session and at the registration desk. If possible, the posting will be done at least a day prior to the planned closed session.

**Note:** It is policy to use metric units of measurement in publications; however, recommendations received by NCWM technical committees and regional weights and measures associations have been printed in this publication as submitted. Therefore, the report may contain references to inch-pound units.

## Subject Series List

## Table A
## Table of Contents

Appendices

## Table B
## Glossary of Acronyms and Terms

| Acronym | Term | Acronym | Term |
|---|---|---|---|
| ABWS | Automatic Bulk Weighing System | NEWMA | Northeastern Weights and Measures Association |
| AAR | Association of American Railroads | NIST | National Institute of Standards and Technology |
| API | American Petroleum Institute | NTEP | National Type Evaluation Program |
| CNG | Compressed Natural Gas | OIML | International Organization of Legal Metrology |
| CWMA | Central Weights and Measures Association | OWM | Office of Weights and Measures |
| EPO | Examination Procedure Outline | RMFD | Retail Motor Fuel Dispenser |
| FHWA | Federal Highway Administration | S&T | Specifications and Tolerances |
| GMM | Grain Moisture Meter | SD | Secure Digital |
| GPS | Global Positioning System | SI | International System of Units |
| HB | Handbook | SMA | Scale Manufactures Association |
| LMD | Liquid Measuring Devices | SWMA | Southern Weights and Measures Association |
| LNG | Liquefied Natural Gas | TC | Technical Committee |
| LPG | Liquefied Petroleum Gas | USNWG | U.S. National Work Group |
| MMA | Meter Manufacturers Association | VTM | Vehicle Tank Meter |
| MDMD | Multiple Dimension Measuring Device | WIM | Weigh-in-Motion |
| NCWM | National Conference on Weights and Measures | WWMA | Western Weights and Measures Association |

**Details of All Items**
*(In order by Reference Key)*

## BLOCK 1 ITEMS (B1) MANIFOLD FLUSH SYSTEMS

**Source:**
New York (2018)

**Purpose:**
Provide specifications and user requirements for manifold flush systems. 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.

### B1: GEN-1 G-S.2. Facilitation of Fraud.

**Item under Consideration:**
Amend NIST Handbook 44 General Code as follows**:**

**G-S.2. Facilitation of Fraud.** – All equipment and all mechanisms, software, and devices attached to or used in conjunction therewith shall be so designed, constructed, assembled, and installed for use such that they do not facilitate the perpetration of fraud. **Where such equipment and/or mechanism will be installed for safety purposes, the device owner must petition, in writing, the weights and measures authority having jurisdiction over the device for a waiver from this specification.**
(Amended 2007 **and 20XX**)

### B1: VTM-1 S.3. Diversion of Measured Liquid and UR.2.6. Clearing the Discharge Hose.

**Item under Consideration:**
Amend NIST Handbook 44 Vehicle-Tank Meters Code as follows**:**

**S.3.1. Diversion of Measured Liquid.** – Except on equipment used exclusively for fueling aircraft **and for metering systems with multiple compartments delivering multiple products through a single discharge hose**, 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 is provided to insure 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.

**S.3.1.1. Means for Clearing the Discharge Hose. For metering systems with multiple compartments delivering multiple products through a single discharge hose, means shall be provided to clear the discharge hose prior to delivery to avoid product contamination. A valve to temporarily divert product from the measuring chamber of the meter to a storage tank, shall be installed only if:**

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

**(b) the valve is permanently marked with its purpose (e.g. flush valve); and**

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

**(d) the system clearly and automatically indicates the direction of product flow during operation; and**

**(e) clear means, such as an indicator light or audible alarm, is used to identify when the valve is in use; and**

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

**(Added 20XX)**

and

**UR.2.6. Clearing the Discharge Hose**

**UR.2.6.1. 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 and available for inspection by weights and measures for a period of 12 months**

**(Added 20XX)**

**Background/Discussion:** See Appendix A, Page S&T-A5.

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

## BLOCK 2 ITEMS (B2) DIVISION SIZE AND TOLERANCES FOR IN-MOTION RAILWAY SYSTEMS

**Source:**
Meridian Engineers Pty Ltd. (2017)

**Purpose:**
Reduce the required minimum scale division value for coupled-in-motion railroad weighing systems that are not used for static reference weighing.

Align the acceptance tolerance values and assign accuracy classes for coupled-in-motion railroad weighing systems with OIML R 106-1 Edition 2011 (E) Automatic rail-weighbridges.

## B2: SCL-1 D Table 3, Parameters for Accuracy Classes

**Item under Consideration:**
Amend NIST Handbook 44, Scales Code as follows:

| ***Table 3. Parameters for Accuracy Classes*** | | | |
|---|---|---|---|
| ***Class*** | ***Value of the Verification Scale Division (d or e[1])*** | ***Number of Scale[4] Divisions (n)*** | |
| | | ***Minimum*** | ***Maximum*** |
| ***SI Units*** | | | |
| *I* | *equal to or greater than 1 mg* | *50 000* | -- |
| *II* | *1 to 50 mg, inclusive* | *100* | *100 000* |
| | *equal to or greater than 100 mg* | *5 000* | *100 000* |
| *III[2,5]* | *0.1 to 2 g, inclusive* | *100* | *10 000* |
| | *equal to or greater than 5 g* | *500* | *10 000* |
| *III L[3]* | *equal to or greater than 2 kg* | *2 000* | *10 000* |
| *IIII* | *equal to or greater than 5 g* | *100* | *1 200* |
| ***U.S. Customary Units*** | | | |
| *III[5]* | *0.0002 lb to 0.005 lb, inclusive* | *100* | *10 000* |
| | *0.005 oz to 0.125 oz, inclusive* | *100* | *10 000* |
| | *equal to or greater than 0.01 lb* | *500* | *10 000* |
| | *equal to or greater than 0.25 oz* | *500* | *10 000* |
| *III L[3]* | *equal to or greater than 5 lb* | *2 000* | *10 000* |
| *IIII* | *greater than 0.01 lb* | *100* | *1 200* |
| | *greater than 0.25 oz* | *100* | *1 200* |

*[1] For Class I and II devices equipped with auxiliary reading means (i.e., a rider, a vernier, or a least significant decimal differentiated by size, shape, or color), the value of the verification scale division "e" is the value of the scale division immediately preceding the auxiliary means.*

*[2] A Class III scale marked "For prescription weighing only" may have a verification scale division (e) not less than 0.01 g.*
(Added 1986) (Amended 2003)

*[3] The value of a scale division for crane and hopper (other than grain hopper* **and coupled-in-motion railroad weighing systems (not used for static reference weighing)** *scales shall be not less than 0.2 kg (0.5 lb). The minimum number of scale divisions shall be not less than 1000.*

*[4] On a multiple range or multi-interval scale, the number of divisions for each range independently shall not exceed the maximum specified for the accuracy class. The number of scale divisions, n, for each weighing range is determined by dividing the scale capacity for each range by the verification scale division, e, for each range. On a scale system with multiple load-receiving elements and multiple indications, each element considered shall not independently exceed the maximum specified for the accuracy class. If the system has a summing indicator, the $n_{max}$ for the summed indication shall not exceed the maximum specified for the accuracy class.*
(Added 1997)

*[5] The minimum number of scale divisions for a Class III Hopper Scale used for weighing grain shall be 2000.*)

[*Nonretroactive as of January 1, 1986*]
(Amended 1986, 1987, 1997, 1998, 1999, 2003, ~~and~~ 2004 **and 20XX**)

## B2: SCL-2 D T.N.3.6. Coupled-in-Motion Railroad Weighing Systems

**Item under Consideration:**
Amend NIST Handbook 44, Scales Code as follows:

**T.N.3.6. Coupled-In-Motion Railroad Weighing Systems.** ~~**The maintenance and acceptance tolerance values for the group of weight values appropriate to the application must satisfy the following conditions:**~~

~~**T.N.3.6.1. For any group of weight values, the difference in the sum of the individual in-motion car weights of the group as compared to the sum of the individual static weights shall not exceed 0.2 %.**~~

~~**T.N.3.6.2. If a weighing system is used to weigh trains of five or more cars, and if the individual car weights are used, any single weight value within the group must meet the following criteria:**~~

~~**(a) no single error may exceed three times the static maintenance tolerance;**~~
~~**(b) not more than 5 % of the errors may exceed two times the static maintenance tolerance; and**~~
~~**(c) not more than 35 % of the errors may exceed the static maintenance tolerance.**~~
~~**(Amended 1990 and 1992)**~~

~~**T.N.3.6.3. For any group of weight values wherein the sole purpose is to determine the sum of the group, T.N.3.6.1. alone applies.**~~
~~**(Amended 1990)**~~

~~**T.N.3.6.4. For a weighing system used to weigh trains of less than five cars, no single car weight within the group may exceed the static maintenance tolerance.**~~

~~**(Amended 1990 and 1992)**~~

**T.N.3.6.1. Accuracy Classes - Systems are divided into four accuracy classes as follows:**

**0.2 0.5 1 2**

**A system may be in a different accuracy class for wagon weighing than that for train weighing.**

**T.N.3.6.2. Tolerance Values – The acceptance and maintenance tolerance values shall be as specified in Table T.N.3.6 below:**

| Accuracy Class | Table T.N.3.6. Percentage of mass of single wagon or train as appropriate | |
|---|---|---|
| | Acceptance Tolerance | Maintenance Tolerance |
| 0.2 | 0.10% | 0.20% |
| 0.5 | 0.25% | 0.50% |
| 1 | 0.50% | 1.00% |
| 2 | 1.00% | 2.00% |

**T.N.3.6.3. Wagon Weighing – The tolerance value for uncoupled or coupled wagon weighing shall be one of the following values, whichever is greater:**

a) **the value calculated according to the appropriate accuracy class in Table T.N.3.6., rounded to the nearest scale interval;**

b) **the value calculated according to the appropriate accuracy class in Table T.N.3.6., rounded to the nearest scale interval for the mass of a single wagon equal to 35 % of the maximum wagon mass (as inscribed on the descriptive markings); or**

c) **1 *d*.**

**On initial verification of an instrument weighing coupled wagons, the errors of not more than 10 % of the weighing results taken from one or more passes of the test train may exceed the appropriate tolerance value given in Table T.N.3.6.but shall not exceed two times that value.**

**T.N.3.6.4. Train Weighing – The tolerance value for train weighing shall be one of the following values, whichever is greater:**

a) **the value calculated according to the appropriate accuracy class in Table T.N.3.6., rounded to the nearest scale interval;**

b) **the value calculated according to the appropriate accuracy class in Table T.N.3.6., for the mass of a single wagon equal to 35 % of the maximum wagon mass (as inscribed on the descriptive markings) multiplied by the number of reference wagons in the train (not exceeding 10 wagons) and rounded to the nearest scale interval, or**

c) **1 d for each wagon in the train but not exceeding 10 d.**

**Background/Discussion:** See Appendix A, Page S&T-A6.

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

## BLOCK 3 ITEMS (B3) SUMMING OF INDIVIDUAL WEIGHING/MEASURING ELEMENTS

**Source:**
Ross Andersen, Retired (2017)

**Purpose:**
Address application of the code requirements across multiple devices.

### B3: SCL-3 D Table 3, Parameters for Accuracy Classes

**Item under Consideration:**
Amend NIST Handbook 44, Scales Code as follows:

***Table 3.***
***Parameters for Accuracy Classes***

| *Class* | *Value of the Verification Scale Division (d or e[1])* | *Number of Scale[4] Divisions (n)* | |
|---|---|---|---|
| | | *Minimum* | *Maximum* |
| ***SI Units*** | | | |
| *I* | *equal to or greater than 1 mg* | *50 000* | -- |
| *II* | *1 to 50 mg, inclusive* | *100* | *100 000* |
| | *equal to or greater than 100 mg* | *5 000* | *100 000* |
| *III[2,5]* | *0.1 to 2 g, inclusive* | *100* | *10 000* |
| | *equal to or greater than 5 g* | *500* | *10 000* |
| *III L[3]* | *equal to or greater than 2 kg* | *2 000* | *10 000* |
| *IIII* | *equal to or greater than 5 g* | *100* | *1 200* |
| ***U.S. Customary Units*** | | | |
| *III[5]* | *0.0002 lb to 0.005 lb, inclusive* | *100* | *10 000* |
| | *0.005 oz to 0.125 oz, inclusive* | *100* | *10 000* |
| | *equal to or greater than 0.01 lb* | *500* | *10 000* |
| | *equal to or greater than 0.25 oz* | *500* | *10 000* |
| *III L[3]* | *equal to or greater than 5 lb* | *2 000* | *10 000* |
| *IIII* | *greater than 0.01 lb* | *100* | *1 200* |
| | *greater than 0.25 oz* | *100* | *1 200* |

*[1] For Class I and II devices equipped with auxiliary reading means (i.e., a rider, a vernier, or a least significant decimal differentiated by size, shape, or color), the value of the verification scale division "e" is the value of the scale division immediately preceding the auxiliary means.*

*[2] A Class III scale marked "For prescription weighing only" may have a verification scale division (e) not less than 0.01 g.*
(Added 1986) (Amended 2003)

*[3] The value of a scale division for crane and hopper (other than grain hopper) scales shall be not less than 0.2 kg (0.5 lb). The minimum number of scale divisions shall be not less than 1000.*

*[4] On a multiple range or multi-interval scale, the number of divisions for each range independently shall not exceed the maximum specified for the accuracy class. The number of scale divisions, n, for each weighing range is determined by dividing the scale capacity for each range by the verification scale division, e, for each range.* ~~***On a scale system with multiple load-receiving elements and multiple indications, each element considered shall not independently exceed the maximum specified for the accuracy class. If the system has a summing indicator, the $n_{max}$ for the summed indication shall not exceed the maximum specified for the accuracy class.***~~
(Added 1997, **Amended 20XX**)

*[5] The minimum number of scale divisions for a Class III Hopper Scale used for weighing grain shall be 2000.*)

[*Nonretroactive as of January 1, 1986*]
(Amended 1986, 1987, 1997, 1998, 1999, 2003, and 2004)

## B3: OTH-1 D Appendix A – Fundamental Considerations: Section 4.4. General Considerations

**Item under Consideration:**
Amend NIST Handbook 44, Appendix A – Fundamental Considerations as follows:

**4.4. General Considerations.** –

The simpler the commercial device, the fewer are the specification requirements affecting it, and the more easily and quickly can adequate inspection be made. As mechanical complexity increases, however, inspection becomes increasingly important and more time consuming, because the opportunities for the existence of faulty conditions are multiplied. It is on the relatively complex device, too, that the official must be on the alert to discover any modification that may have been made by an operator that might adversely affect the proper functioning of the device. **Code requirements in the Handbook are applied only to a single device or system, unless specifically stated in the code. An electronic sum of measured values from multiple devices is not subject to code requirements, except that it be mathematically correct, i.e. add up to the proper sum - See General Code G-S.5.2.2.(e).**

It is essential for the officials to familiarize themselves with the design and operating characteristics of the devices that he inspects and tests. Such knowledge can be obtained from the catalogs and advertising literature of device manufacturers, from trained service persons and plant engineers, from observation of the operations performed by service persons when reconditioning equipment in the field, and from a study of the devices themselves.

Inspection should include any auxiliary equipment and general conditions external to the device that may affect its performance characteristics. In order to prolong the life of the equipment and forestall rejection, inspection should also include observation of the general maintenance of the device and of the proper functioning of all

required elements. The official should look for worn or weakened mechanical parts, leaks in volumetric equipment, or elements in need of cleaning.
**(Amended 20XX)**

**Background/Discussion:** See Appendix A, Page S&T-A8.

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

## BLOCK 4 ITEMS (B4) TERMINOLOGY FOR TESTING STANDARDS

**Source:**
NIST OWM (2018)

**Purpose:**
To remove the current limited definition and use of the term "Transfer Standard" and eliminate terms "Testing Standards", "Verification (Testing) Standards", and instead use the term Field Standard, consistent with its reference in Handbook 44, Appendix A, Fundamental Considerations and its use in several sections of Handbook 44. To correct the broad use of the term Transfer Standard and instead replace its use with the term Field Standard. To update all use of the term "standard" to use the term "Field Standard". To remove the current limited definition of Transfer Standard and instead use the term Field Standard.

### B4: SCL-4 N.2. Verification (Testing) Standards

**Item under Consideration:**
Amend NIST Handbook 44, Scales Code as follows:

N.2. ~~**Verification (Testing)**~~ **Field** Standards. – Field standard weights used in verifying weighing devices shall comply with requirements of NIST Handbook 105-Series standards (or other suitable and designated standards) or the tolerances expressed in Fundamental Considerations, paragraph 3.2. (i.e., one-third of the smallest tolerance applied).
(Amended 1986 **and 20XX**)

### B4: ABW-1 N.2. Verification (Testing) Standards

**Item under Consideration:**
Amend NIST Handbook 44, Automatic Bulk Weighing Systems Code as follows:

**N.2. ~~Verification (Testing)~~ Field Standards**. – **Field S~~s~~**tandard weights and masses used in verifying weighing devices shall comply with requirements of NIST Handbook 105-1 (Class F) or the tolerances expressed in Appendix A, Fundamental Considerations, paragraph 3.2. (i.e., one-third of the smallest tolerance applied).
**(Amended 20XX)**

## B4: AWS-1 N.1.3. Verification (Testing) Standards, N.3.1. Official Tests, UR.4. Testing Standards

**Item under Consideration:**
Amend NIST Handbook 44, Automatic Weighing Systems Code as follows:

**N.1.3. ~~Verification (Testing)~~ Field Standards.** – Field standard weights shall comply with requirements of NIST Handbook 105-1, "Specifications and Tolerances for Field Standard Weights (Class F)" or the tolerances expressed in Fundamental Considerations, paragraph 3.2. (i.e., one-third of the smallest tolerance applied).
**(Amended 20XX)**

**N.3.1. Official Tests.** – Officials are encouraged to periodically witness the required "in house" verification of accuracy. Officials may also conduct official tests using the on-site ~~**testing**~~ **field** standards or other appropriate standards belonging to the jurisdiction with statutory authority over the device or system.
**(Amended 20XX)**

**UR.4. ~~Testing~~ Field Standards**. – The user of a commercial device shall make available to the official with statutory authority over the device ~~**testing**~~ **field** standards that meet the tolerance expressed in Fundamental Considerations, paragraph 3.2. Tolerances for Standards (i.e., one-third of the smallest tolerance applied). The accuracy of the ~~**testing**~~ **field** standards shall be verified annually or on a frequency as required by the official with statutory authority and shall be traceable to the appropriate SI standard.
**(Amended 20XX)**

## B4: CLM-1 N.3.2. Transfer Standard Test and T.3. On Tests Using Transfer Standards

**Item under Consideration:**
Amend NIST Handbook 44, Cryogenic Liquid-Measuring Devices Code as follows:

**N.3.2. ~~Transfer~~ Field Standard Test**. – When comparing a meter with a calibrated ~~**transfer**~~ **field** standard, the test draft shall be equal to at least the amount delivered by the device in two minutes at its maximum discharge rate, and shall in no case be less than 180 L (50 gal) or equivalent thereof. When testing uncompensated volumetric meters in a continuous recycle mode, appropriate corrections shall be applied if product conditions are abnormally affected by this test mode.
(Amended 1976 **and 20XX**)

~~**T.3. On Tests Using 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. (Added 1976)**~~

## B4: CDL-1 N.3.2. Transfer Standard Test, T.3. On Tests Using Transfer Standards

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

**N.3.2. ~~Transfer~~ Field Standard Test.** – When comparing a meter with a calibrated ~~**transfer**~~ **field** standard, the test draft shall be equal to at least the amount delivered by the device in two minutes at its maximum discharge rate.

**(Amended 20XX)**

~~**T.3. On Tests Using 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.**~~

## B4: HGM-1 N.4.1. Master Meter (Transfer) Standard Test, T.4. Tolerance Application on Test Using Transfer Standard Test Method

**Item under Consideration:**
Amend NIST Handbook 44, Hydrogen Gas-Measuring Devices Tentative Code as follows:

**N.4.1. Master Meter ~~(Transfer)~~ Field Standard Test.** – When comparing a measuring system with a calibrated ~~**transfer**~~ **field** standard, the minimum test shall be one test draft at the declared minimum measured quantity and one test draft at approximately ten times the minimum measured quantity or 1 kg, whichever is greater. More tests may be performed over the range of normal quantities dispensed.
**(Amended 20XX)**

~~**T.4. Tolerance Application on Test 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.**~~

## B4: GMM-1 5.56(a): N.1.1. Air Oven Reference Method Transfer Standards, N.1.3. Meter to Like-Type Meter Method Transfer Standards and 5.56(b): N.1.1. Transfer Standards, T. Tolerances[1]

**Item under Consideration:**
Amend NIST Handbook 44, Grain Moisture Meters Code as follows:

**5.56.(a) Grain Moisture Meters**

**N.1.1. Air Oven Reference Method ~~Transfer~~ Field Standards.** – Official grain samples shall be used as the official ~~**transfer**~~ **field** standards with moisture content and test weight per bushel values assigned by the reference methods. The reference methods for moisture shall be the oven drying methods as specified by the USDA GIPSA. The test weight per bushel value assigned to a test weight transfer standard shall be the average of 10 test weight per bushel determinations using the quart kettle test weight per bushel apparatus as specified by the USDA GIPSA. Tolerances shall be applied to the average of at least three measurements on each official grain sample. Official grain samples shall be clean and naturally moist, but not tempered (i.e., water not added). (Amended 1992, 2001, ~~**and**~~ 2003**, and 20XX**)

**N.1.3. Meter to Like-Type Meter Method Transfer Standards.** – Properly standardized reference meters using National Type Evaluation Program approved calibrations shall be used as ~~**transfer**~~ **field** standards. A reference meter shall be of the same type as the meter under test. Tests shall be conducted side-by-side using, as a comparison medium, grain samples that are clean and naturally moist, but not tempered (i.e., water not added). (Added 2001) **(Amended 20XX)**

**5.56.(b) Grain Moisture Meters**

**N.1.1. ~~Transfer~~ Field Standards.** – Official grain samples shall be used as the official **~~transfer~~ field** standards with moisture content values assigned by the reference methods. The reference methods shall be the oven drying methods as specified by the USDA GIPSA. Tolerances shall be applied to the average of at least three measurements on each official grain sample. Official grain samples shall be clean and naturally moist, but not tempered (i.e., water not added).
(Amended 1992 **and 20XX**)

**T. Tolerances[1]**

[1]These tolerances do not apply to tests in which grain moisture meters are the **~~transfer~~ field** standards.
**(Amended 20XX)**

## B4: LVS-1 N.2. Testing Standards

**Item under Consideration:**
Amend NIST Handbook 44, Electronic Livestock, Meat and Poultry Evaluation Systems and/or Devices Code as follows:

**N.2. ~~Testing~~ Field Standards.** – ASTM Standard F2343 requires device or system users to maintain accurate **~~reference~~ field** standards that meet the tolerance expressed in NIST Handbook 44 Fundamental Considerations, paragraph 3.2. Tolerances for Standards (i.e., one-third of the smallest tolerance applied).
**(Amended 20XX)**

## B4: OTH-2 Appendix A: Fundamental Considerations, 3.2. Tolerances for Standards, 3.3. Accuracy of Standards

**Item under Consideration:**
Amend NIST Handbook 44, Appendix A: Fundamental Considerations as follows:

**3.2. Tolerances for Field Standards.** – Except for work of relatively high precision, it is recommended that the accuracy of standards used in testing commercial weighing and measuring equipment be established and maintained so that the use of corrections is not necessary. When the 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.
**(Amended 20XX)**

**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.
**(Amended 20XX)**

### B4: OTH-3 Appendix D – Definitions: fifth-wheel, official grain samples~~, transfer standard~~ and Standard, Field

**Item under Consideration:**
Amend NIST Handbook 44, Appendix A: Fundamental Considerations as follows:

**fifth wheel.** – A commercially-available distance-measuring device which, after calibration, is recommended for use as a field ~~**transfer**~~ standard for testing the accuracy of taximeters and odometers on rented vehicles. [5.53, 5.54]
**(Amended 20XX)**

**official grain samples.** – Grain or seed used by the official as the official ~~**transfer**~~ **field** standard from the reference standard method to test the accuracy and precision of grain moisture meters. [5.56(a), 5.56(b)]
**(Amended 20XX)**

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

**Standard, Field. – A physical standard that meets specifications and tolerances in NIST Handbook 105-series standards (or other suitable and designated standards) and is traceable to the reference or working standards through comparisons, using acceptable laboratory procedures, and used in conjunction with commercial weighing and measuring equipment.**
**(Added 20XX)**

**Background/Discussion:** See Appendix A, Page S&T-A16.

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

## BLOCK 5 ITEMS (B5) DEFINE "FIELD REFERENCE STANDARD"

**Source:**
Endress+Hauser Flowtec AG (2018)

**Purpose:**
Add definition field reference standard meter to HB 44. Delete transfer standard definition. Change terms in sections 3.34, 3.38 and 3.39.

## B5: CLM-2 N.3.2. Transfer Standard Test and T.3. On Tests Using Transfer Standards

**Item under Consideration:**
Amend NIST Handbook 44, Cryogenic Liquid-Measuring Devices Code as follows:

**N.3.2. Field Reference~~Transfer~~ Standard Meter Test**. – When comparing a meter with a calibrated **field reference~~transfer~~** standard **meter**, the test draft shall be equal to at least the amount delivered by the device in two minutes at its maximum discharge rate, and shall in no case be less than 180 L (50 gal) or equivalent thereof. When testing uncompensated volumetric meters in a continuous recycle mode, appropriate corrections shall be applied if product conditions are abnormally affected by this test mode.
(Amended 1976 **and 20XX**)

**T.3. On Tests Using Field ReferenceTransfer Standard~~s~~ Meters. –** 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 **field reference~~transfer~~** standard **meter** when compared to a basic reference standard. (Added 1976)

## B5: CDL-2 N.3.2. Transfer Standard Test and T.3. On Tests Using Transfer Standards

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

**N.3.2. Field Reference~~Transfer~~ Standard Meter Test.** – When comparing a meter with a calibrated **field reference~~transfer~~** standard **meter**, the test draft shall be equal to at least the amount delivered by the device in two minutes at its maximum discharge rate.
**(Amended 20XX)**

**T.3. On Tests Using Field Reference~~Transfer~~ Standard~~s~~ Meters. –** 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 **field reference~~transfer~~** standard when compared to a basic **field reference~~reference~~** standard **meter**.

## B5: HGM-2 N.4.1. Master Meter (Transfer) Standard Test and T.4. Tolerance Application on Test Using Transfer Standard Test Method

**Item under Consideration:**
Amend NIST Handbook 44, Hydrogen Gas-Measuring Devices Tentative Code as follows:

**N.4.1. Field Reference~~Master Meter (Transfer)~~ Standard Meter Test.** – When comparing a measuring system with a calibrated **field reference~~transfer~~** standard **meter**, the minimum test shall be one test draft at the declared minimum measured quantity and one test draft at approximately ten times the minimum measured quantity or 1 kg, whichever is greater. More tests may be performed over the range of normal quantities dispensed.
**(Amended 20XX)**

**T.4. Tolerance Application on Test Using Field Reference~~Transfer~~ Standard Meters 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 **field reference~~transfer~~** standard **meter** when compared to a basic reference standard.

### B5: OTH-4 Appendix D – Definitions: field reference standard meter and ~~transfer standard~~

**Item under Consideration:**
Amend NIST Handbook 44, Appendix D as follows:

**field reference standard meter – A measurement system designed for use in proving and testing measuring devices and meters.**

~~transfer standard – A measurement system designed for use in proving and testing cryogenic liquid measuring devices.~~

**Background/Discussion:** See Appendix A, Page S&T-A18.

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

## BLOCK 6 ITEMS (B6) ALIGN VAPOR ELIMINATION REQUIREMENTS AMONG CODES

**Source:**
NIST OWM (2018)

**Purpose:**
To align language in Sections 3.32 LPG and Anhydrous Ammonia Liquid-Measuring Devices Code; 3.34 Cryogenic Liquid Measuring Devices Code; and 3.38. Carbon Dioxide Liquid-Measuring Devices Code with changes adopted in 2017 to the Liquid-Measuring Devices Code; the Vehicle-Tank Meters Code; the Milk Meters Code; the Water Meters Code; and the Mass Flow Meters Code.

### B6: LPG-1 S.2.1. Vapor Elimination. (See related items New-17 and New-18)

**Item under Consideration:**
Amend NIST Handbook 44 LPG and Anhydrous Ammonia Liquid-Measuring Devices as follows:

**S.2.1. Air/Vapor Elimination.** A ~~**device**~~ **measuring system** shall be equipped with an effective **air/vapor eliminator or other** automatic means to prevent the passage of **air/**vapor through the meter. Vent lines from the **air/**vapor eliminator shall be made of appropriate non-collapsible material.
(Amended 2016 **and 20XX**)

### B6: CLM-3 S.2.1. Vapor Elimination.

**Item under Consideration:**
Amend NIST Handbook 44, Cryogenic Liquid-Measuring Devices Code as follows:

**S.2.1. Air/Vapor Elimination.** – A measuring system shall be equipped with an effective **air/**vapor eliminator or other ~~**effective**~~ **automatic** means to prevent the ~~measurement of vapor that will cause errors in excess of the applicable tolerances~~ **passage of air/vapor through the meter. Vent lines from the air/vapor eliminator shall be made of appropriate non-collapsible material.** (Also see Section T. Tolerances.)

**(Amended 20XX)**

### B6: CDL-3 S.2.1. Vapor Elimination.

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

**S.2. Design of Measuring Elements.**

**S.2.1. Air/Vapor Elimination.**

**(a)** A **device** **measuring system** shall be equipped with an effective **air/vapor eliminator or other** automatic means to prevent the passage of **air/**vapor through the meter.
**(b)** Vent lines from the **air/**vapor eliminator shall be made of appropriate non-collapsible material.
(Amended 2016 **and 20XX**)

**Background/Discussion:** See Appendix A, Page S&T-A19.

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

## BLOCK 7 ITEMS (B7) ADDRESS DEVICES AND SYSTEMS ADJUSTED USING A REMOVABLE DIGITAL STORAGE DEVICE

**Source:**
NIST office of Weights and Measures (2013)

**Purpose:**
Expand the scope of definition to cover instances where the "other device," as noted in the current definition, may be necessary to the operation of the weighing or measuring device or which may be considered a permanent part of that device.

### B7: GEN-2 D G-S.8.2. Devices and Systems Adjusted Using Removable Digital Device Storage

**Item Under Consideration:**
Modify the General Code as follows

**G-S.8.2. Devices and Systems Adjusted Using Removable Digital Storage Device. - For devices and systems in which the configuration or calibration parameters can be changed by use of a removable digital storage device, such as a secure digital (SD) card, USB flash drive, etc., security shall be provided for those parameters using an event logger in the device. The event logger shall include an event counter (000 to 999), the parameter ID, the date and time of the change, and the new value of the parameter. A printed copy of the information must be available on demand through the device or through another on-site device. In addition to providing a printed copy of the information, the information may be made available electronically. The event logger shall have a capacity to retain records equal to 10 times the number of sealable parameters in the device, but not more than 1000 records are required. (Note: Does not require 1000 changes to be stored for each parameter.)**

**(Added 20XX)**

## B7: SCL-5 D S.1.11. Provision for Sealing.

**Item Under Consideration:**
Modify the Scales Code as follows:

**S.1.11.1 Devices and Systems Adjusted Using a Removable Digital Storage Device. - For devices and systems in which the calibration or configuration parameters, as defined in Appendix D, can be changed by use of a removable digital storage device, security shall be provided for those parameters as specified in G-S.8.2.**

**S.1.11.2 All Other Devices. -** ***Except on Class I scales and devices specified in S.1.11.1. the following provisions for sealing applies:***

*(a) Provision shall be made for applying a security seal in a manner that requires the security seal to be broken before an adjustment can be made to any component affecting the performance of an electronic device.*
*[Nonretroactive as of January 1, 1979]*

*(b) A device shall be designed with provision(s) for applying a security seal that must be broken, or for using other approved means of providing security (e.g., data change audit trail available at the time of inspection), before any change that detrimentally affects the metrological integrity of the device can be made to any electronic mechanism.*
*[Nonretroactive as of January 1, 1990]*

*(c) Audit trails shall use the format set forth in Table S.1.11.*
*[Nonretroactive as of January 1, 1995]*

A device may be fitted with an automatic or a semi-automatic calibration mechanism. This mechanism shall be incorporated inside the device. After sealing, neither the mechanism nor the calibration process shall facilitate fraud.
(Amended 1989, 1991, 1993**,** and **20XX**)

## B7: BCS-1 D S.5. Provision for Sealing.

**Item Under Consideration:**
Modify the Belt-Conveyor Scale Systems Scales Code as follows:

**S.5. Provision for Sealing.** – **For devices and systems in which the configuration or calibration parameters can be changed by use of a removable digital storage device, security shall be provided for those parameters as specified in G-S.8.2.** ***For all other devices, the following provisions for sealing apply:***

*A device shall be designed using the format set forth in Table S.5. with provision(s) for applying a security seal that must be broken, or for using other approved means of providing security (e.g. data change audit trail available at the time of inspection), before any change that affects the metrological integrity of the device can be made to any electronic mechanism.*
*[Nonretroactive as of January 1, 1999]*

(Added 1998) **(Amended 20XX)**

## B7: ABW-2 D S.1.6. Provision for Sealing Adjustable Components on Electronic Devices.

**Item Under Consideration:**
Modify the Automatic Bulk Weighing Systems Code as follows:

**S.1.6. Provision for Sealing Adjustable Components on Electronic Devices.** – **For devices and systems in which the configuration or calibration parameters can be changed by use of a removable digital storage device, security shall be provided for those parameters as specified in G-S.8.2. For parameters adjusted using other means, p~~P~~**rovision shall be made for applying a security seal in a manner that requires the security seal to be broken before an adjustment can be made to any component affecting the performance of the device.

**(Amended 20XX)**

## B7: AWS-2 D S.1.3. Provision for Sealing.

**Item Under Consideration:**
Modify the Automatic Weighing Systems Code as follows:

**S.1.3. Provision for Sealing.**

(a) **Automatic Weighing Systems, Except Automatic Checkweighers.** – **For devices and systems in which the configuration or calibration parameters can be changed by use of a removable digital storage device, security shall be provided for those parameters as specified in G-S.8.2.**

**For parameters adjusted using other means, a ~~A~~** device shall be designed with provision(s) as specified in Table S.1.3. Categories of Device and Methods of Sealing for applying a security seal that must be broken, or for using other approved means of providing security (e.g., data change audit trail available at the time of inspection), before any change that detrimentally affects the metrological integrity of the device can be made to any electronic mechanism.

(b) **For Automatic Checkweighers.** – Security seals are not required in applications where it would prohibit an authorized user from having access to the calibration functions of a device.

**(Amended 20XX)**

## B7: LMD-1 D S.2.2. Provision for Sealing.

**Item Under Consideration:**
Modify the Liquid Measuring Devices Code as follows:

**S.2.2. Provision for Sealing.** – **For devices and systems in which the configuration or calibration parameters can be changed by use of a removable digital storage device, security shall be provided for those parameters as specified in G-S.8.2. For parameters adjusted using other means, the following applies:**

Adequate provision shall be made for an approved means of security (e.g., data change audit trail) or for physically applying a security seal in such a manner that requires the security seal to be broken before an adjustment or interchange can be made of:

(a) any measuring or indicating element;

(b) any adjustable element for controlling delivery rate when such rate tends to affect the accuracy of deliveries; and

(c) any metrological parameter that will affect the metrological integrity of the device or system.

When applicable, the adjusting mechanism shall be readily accessible for purposes of affixing a security seal.

*[Audit trails shall use the format set forth in Table S.2.2.]**
*[*Nonretroactive and Enforceable as of January 1, 1995]*

(Amended 1991, 1993, 1995, 2006**,** and **20XX**)

## B7: VTM-2 D S.2.2. Provision for Sealing.

**Item Under Consideration:**
Modify the Vehicle Tank Meters Code as follows:

**S.2.2. Provision for Sealing.** – **For devices and systems in which the configuration or calibration parameters can be changed by use of a removable digital storage device, security shall be provided for those parameters as specified in G-S.8.2. For parameters adjusted using other means, the following applies:**

Adequate provision shall be made for an approved means of security (e.g., data change audit trail) or for physically applying a security seal in such a manner that requires the security seal to be broken before a change or an adjustment or interchange may be made of:

(a) any measuring or indicating element;

(b) any adjustable element for controlling delivery rate when such rate tends to affect the accuracy of deliveries; and

(c) any metrological parameter that will affect the metrological integrity of the device or system.

When applicable, the adjusting mechanism shall be readily accessible for purposes of affixing a security seal.
*[Audit trails shall use the format set forth in Table S.2.2. Categories of Device and Methods Sealing.]**
*[*Nonretroactive as of January 1, 1995]*

(Amended 2006 **and 20XX**)

## B7: LPG-2 D S.2.2. Provision for Sealing.

**Item Under Consideration:**
Modify the LPG and Anhydrous Ammonia Liquid-Measuring Devices Code as follows:

**S.2.2. Provision for Sealing. For devices and systems in which the configuration or calibration parameters can be changed by use of a removable digital storage device, security shall be provided for those parameters as specified in G-S.8.2. For parameters adjusted using other means, the following applies:**

Adequate provision shall be made for an approved means of security (e.g., data change audit trail) or for physically applying a security seal in such a manner that requires the security seal to be broken before an adjustment or interchange may be made of:

(a) any measuring or indicating element;

(b) any adjustable element for controlling delivery rate, when such rate tends to affect the accuracy of deliveries; and

(c) any metrological parameter that will affect the metrological integrity of the device or system.

When applicable, the adjusting mechanism shall be readily accessible for purposes of affixing a security seal.

*[Audit trails shall use the format set forth in Table S.2.2. Categories of Device and Methods of Sealing.]**

*[*Nonretroactive as of January 1, 1995]*

(Amended 2006 **and 20XX**)

## B7: HGV-1 D S.2.2. Provision for Sealing.

**Item Under Consideration:**
Modify the Hydrocarbon Gas Vapor-Measuring Devices Code as follows:

**S.2.2. Provision for Sealing. For devices or systems in which the configuration or calibration parameters can be changed by use of a removable digital storage device, security shall be provided for those parameters as specified in G-S.8.2. For parameters adjusted using other means, the following applies:**

Adequate provision shall be made for applying security seals in such a manner that no adjustment or interchange may be made of any measurement element.

**(Amended 20XX)**

## B7: CLM-4 D S.2.5. Provision for Sealing.

**Item Under Consideration:**
Modify Cryogenic Liquid-Measuring Devices Code as follows:

**S.2.5. Provision for Sealing. – For devices or systems in which the configuration or calibration parameters can be changed by use of a removable digital storage device, security shall be provided for those parameters as specified in G-S.8.2. For parameters adjusted using other means, the following applies:**

Adequate provision shall be made for an approved means of security (e.g., data change audit trail) or for physically applying a security seal in such a manner that requires the security seal to be broken before an adjustment or interchange may be made of:

(a) any measuring or indicating element;

(b) any adjustable element for controlling delivery rate when such rate tends to affect the accuracy of deliveries;

(c) any automatic temperature or density compensating system; and

(d) any metrological parameter that will affect the metrological integrity of the device or system.

When applicable, any adjusting mechanism shall be readily accessible for purposes of affixing a security seal.

[Audit trails shall use the format set forth in Table S.2.5. Categories of Device and Methods of Sealing]*[*Nonretroactive as of January 1, 1995]

(Amended 2006 **and 20XX**)

## B7: MLK-1 D S.2.3. Provision for Sealing.

**Item Under Consideration:**
Modify Milk Meters Code as follows:

**S.2.3. Provision for Sealing. – <u>For devices and systems in which the configuration or calibration parameters can be changed by use of a removable digital storage device, security shall be provided for those parameters as specified in G-S.8.2. For parameters adjusted using other means, the following applies:</u>**

Adequate provision shall be made for an approved means of security (e.g., data change audit trail) or for physically applying a security seal in such a manner that requires the security seal to be broken before an adjustment or interchange may be made of any:

(a) measuring element or indicating element;

(b) adjustable element for controlling delivery rate, when such rate tends to affect the accuracy of deliveries; and

(c) metrological parameter that will affect the metrological integrity of the device or system.

When applicable, the adjusting mechanism shall be readily accessible for purposes of affixing a security seal.

*[Audit trails shall use the format set forth in Table S.2.3. Categories of Device and Methods of Sealing]* [*Nonretroactive as of January 1, 1995]*

(Amended 2006 **and 20XX**)

## B7: WTR-1 D S.2.1. Provision for Sealing.

**Item Under Consideration:**
Modify Water Meters Code as follows:

**S.2.1. Provision for Sealing. – <u>For devices or systems in which the configuration or calibration parameters can be changed by use of a removable digital storage device, security shall be provided for those parameters as specified in G-S.8.2. For parameters adjusted using other means, the following applies:</u>**

Adequate provision shall be made for applying security seals in such a manner that no adjustment or interchange may be made of:

(a) any measurement elements; and

(b) any adjustable element for controlling delivery rate when such rate tends to affect the accuracy of deliveries.

The adjusting mechanism shall be readily accessible for purposes of affixing a security seal.

**(Amended 20XX)**

## B7: MFM-1 D S.3.5. Provision for Sealing.

**Item Under Consideration:**
Modify Mass Flow Meters Code as follows:

**S.3.5. Provision for Sealing.** – **For devices or systems in which the configuration or calibration parameters can be changed by use of a removable digital storage device, security shall be provided for those parameters as specified in G-S.8.2. For parameters adjusted using other means, the following applies:**

Adequate provision shall be made for an approved means of security (e.g., data change audit trail) or physically applying security seals in such a manner that no adjustment or interchange may be made of:

(a) any measuring or indicating element;

(b) any adjustable element for controlling delivery rate when such rate tends to affect the accuracy of deliveries;

(c) the zero adjustment mechanism; and

(d) any metrological parameter that will affect the metrological integrity of the device or system.

When applicable, the adjusting mechanism shall be readily accessible for purposes of affixing a security seal.

*[Audit trails shall use the format set forth in Table S.3.5. Categories of Device and Methods of Sealing]* [*Nonretroactive as of January 1, 1995]*

(Amended 1992, 1995, 2006**,** and **20XX**)

## B7: CDL-4 D S.2.5. Provision for Sealing.

**Item Under Consideration:**
Modify Carbon Dioxide Liquid-Measuring Devices Code as follows:

**S.2.5. Provision for Sealing.** – **For devices and systems in which the configuration or calibration parameters can be changed by use of a removable digital storage device, security shall be provided for those parameters as specified in G-S.8.2. For parameters adjusted using other means, the following applies:**

Adequate provision shall be made for an approved means of security (e.g., data change audit trail) or for physically applying a security seal in such a manner that requires the security seal to be broken before an adjustment or interchange may be made of:

(a) any measuring or indicating element;

(b) any adjustable element for controlling delivery rate when such rate tends to affect the accuracy of deliveries;

(c) any automatic temperature or density compensating system; and

(d) any metrological parameter that will affect the metrological integrity of the device or system.

When applicable any adjusting mechanism shall be readily accessible for purposes of affixing a security seal.

*[Audit trails shall use the format set forth in Table S.2.5. Provision for Sealing]**
*[*Nonretroactive as of January 1, 1995]*
(Amended 2006 **and 20XX**)

## B7: HGM-3 D S.3.3. Provision for Sealing.

**Item Under Consideration:**
Modify Hydrogen Gas-Measuring Devices Tentative Code as follows:

**S.3.3. Provision for Sealing.** – **For devices and systems in which the configuration or calibration parameters can be changed by use of a removable digital storage device, security shall be provided for those parameters as specified in G-S.8.2. For parameters adjusted using other means, the following applies:**

Adequate provision shall be made for an approved means of security (e.g., data change audit trail) or physically applying security seals in such a manner that no adjustment may be made of:

(a) each individual measurement element;

(b) any adjustable element for controlling delivery rate when such rate tends to affect the accuracy of deliveries;

(c) the zero adjustment mechanism; and

(d) any metrological parameter that detrimentally affects the metrological integrity of the device or system.

When applicable, the adjusting mechanism shall be readily accessible for purposes of affixing a security seal. Audit trails shall use the format set forth in Table S.3.3. Categories of Device and Methods of Sealing.

**(Amended 20XX)**

## B7: EVF-1 D S.3.3. Provision for Sealing.

**Item Under Consideration:**
Modify Electric Vehicle Refueling Systems Code as follows:

**S.3.3. Provision for Sealing. – <u>For devices or systems in which the configuration or calibration parameters can be changed by use of a removable digital storage device, security shall be provided for those parameters as specified in G-S.8.2. For parameters adjusted using other means, the following applies:</u>**

Adequate provision shall be made for an approved means of security (e.g., data change audit trail) or physically applying security seals in such a manner that no adjustment may be made of:

(a) each individual measurement element;

(b) any adjustable element for controlling voltage or current when such control tends to affect the accuracy of deliveries;

(c) any adjustment mechanism that corrects or compensates for energy loss between the system and vehicle connection; and

(d) any metrological parameter that detrimentally affects the metrological integrity of the EVSE or system.

When applicable, the adjusting mechanism shall be readily accessible for purposes of affixing a security seal. Audit trails shall use the format set forth in Table S.3.3. Categories of Device and Methods of Sealing.

**<u>(Amended 20XX)</u>**

## B7: TIM-1 D S.4. Provision for Sealing.

**Item Under Consideration:**
Modify Timing Devices Code as follows:

**S.4. Provisions for Sealing. – <u>For devices or systems in which the configuration or calibration parameters can be changed by use of a removable digital storage device, security shall be provided for those parameters as specified in G-S.8.2. For parameters adjusted using other means,</u> ~~A~~<u>a</u>**dequate provisions shall be made to provide security for the timing element.
(Added 2015) **<u>(Amended 20XX)</u>**

## B7: GMM-2 D S.2.5. Provision for Sealing.

**Item Under Consideration:**
Modify 5.56.(a) Grain Moisture Meters Code as follows:

**S.2.5. Provision for Sealing. – <u>For devices and systems in which the configuration or calibration parameters can be changed by use of a removable digital storage device, security shall be provided for those parameters as specified in G-S.8.2. For parameters adjusted using other means, the following applies:</u>**

~~P~~rovision shall be made for applying a security seal in a manner that requires the security seal to be broken, or for using other approved means of providing security (e.g., audit trail available at the time of inspection as defined in Table S.2.5. Categories of Device and Methods of Sealing) before any change that affects the metrological integrity of the device can be made to any mechanism.
**(Amended 20XX)**

### B7: MDM-1 D S.1.11. Provision for Sealing.

**Item Under Consideration:**
Modify Multiple Dimension Measuring Devices Code as follows:

**S.1.11. Provision for Sealing. - For devices and systems in which the configuration or calibration parameters can be changed by use of a removable digital storage device, security shall be provided for those parameters as specified in G-S.8.2. For parameters adjusted using other means, the following applies:**

(a) **~~A~~ The** device **or system** shall be designed with provision(s) for applying a security seal that must be broken, or for using other approved means of providing security (e.g., data change audit trail available at the time of inspection), before any change that detrimentally affects the metrological integrity **~~of the device~~** can be made to any measuring element.

(b) Audit trails shall use the format set forth in Table S.1.11. Categories of Devices and Methods of Sealing for Multiple Dimension Measuring Systems.

**(Amended 20XX)**

**Background/Discussion:** See Appendix A, Page S&T-A20.

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

## GEN – GENERAL CODE

### GEN-3 G-A.1. Commercial and Law-Enforcement Equipment. and G-S.2. Facilitation of Fraud.

**Source:**
Arizona, Florida, Maine, Michigan and Cambridge, Massachusetts (2018)

**Purpose:**
To prevent access and tampering by unauthorized persons to any area of the device where electronic financial transactions occur, credit card information is obtained, and or personal information is stored or transmitted.

**Item under Consideration:**
Amend NIST Handbook 44 General Code as follows**:**

**G-A.1. Commercial and Law-Enforcement Equipment.** – These specifications, tolerances, and other technical requirements apply as follows:

(a) To commercial weighing and measuring equipment; that is, to weights and measures and weighing and measuring devices commercially used or employed in establishing the size, quantity, extent, area, composition (limited to meat and poultry), constituent values (limited to grain), or measurement of quantities,
things, produce, or articles for distribution or consumption, purchased, offered, or submitted for sale, hire, or
award, or in computing any basic charge or payment for services rendered on the basis of weight or measure.
(Amended 2008)

(b) To any accessory attached to or used in connection with a commercial weighing or measuring device when
such accessory is so designed that its operation affects the accuracy **or can be used to defraud or collect unauthorized personal or financial information from the user** of the device.

(c) To weighing and measuring equipment in official use for the enforcement of law or for the collection of statistical information by government agencies.

**G-S.2. Facilitation of Fraud.** – All equipment and all mechanisms, software, and devices attached to or used in conjunction therewith shall be so designed, constructed, assembled, and installed for use such that they do not facilitate the perpetration of fraud. **Any device capable of customer initiated electronic financial transactions shall incorporate an event counter that records date and time of access and must be of such design and construction to substantially restrict access and tampering by unauthorized persons to any area of the device where financial transactions occur, credit card information is obtained, and or personal information is stored or transmitted. Restriction of access and tampering may be accomplished by;**

**(a) Electronic alarming or disabling of the equipment if unauthorized access is gained or,**

**(b) Physical means that cannot be breached without causing visible damage to the exterior of the device. Such physical means shall not include the use of a universal key, master key or security device that can be manipulated with universal tools.**

(Amended 2007 **and 20XX**)

**Background/Discussion:** See Appendix A, Page S&T-A24.

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

## SCL – SCALES

### SCL-6 S.1.2.2.3. Deactivation of a "d" Resolution

**Source:**
NIST OWM (2018)

**Purpose:**
To ensure that a Class I or II scale with the capability of deactivating a "d" resolution continues to round properly when the "d" resolution is deactivated.

**Item under Consideration:**
Amend NIST Handbook 44, Scales Code as follows:

**S.1.2.2.3. Deactivation of a "d" Resolution. - It shall not be possible to deactivate the "d" resolution on a Class I or II scale equipped with a value of "d" that differs from "e" if such action affects the scale's ability to round digital values to the nearest minimum unit that can be indicated or recorded as required by paragraph G-S.5.2.2.**
**(Added 20XX)**

**Background/Discussion:** See Appendix A, Page S&T-A25.

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

## SCL-7 S.1.8.5. Recorded Representations, Point of Sale Systems

**Source:**
Kansas and Minnesota (2017)

**Purpose:**
Provide consumers the same opportunity, to be able to easily verify whether or not tare is taken on items weighed at a checkout stand using a POS system, which is currently afforded them when witnessing items being weighed and priced in their presence using other scales in the store.

**Item under Consideration:**
Amend NIST Handbook 44, Scales Code as follows:

**S.1.8.5. Recorded Representations, Point-of-Sale Systems.** – The sales information recorded by cash registers when interfaced with a weighing element shall contain the following information for items weighed at the checkout stand:

(a) the net weight;[1]

(b) the unit price;[1]

(c) the total price; and

(d) the product class or, in a system equipped with price look-up capability, the product name or code number.

**(e)** ***the tare weight[1]***
***[Non-retroactive January 1, 2022]***
**(Amended 20XX)**

_____

[1] For devices interfaced with scales indicating in metric units, the unit price may be expressed in price per 100 grams. Weight values shall be identified by kilograms, kg, grams, g, ounces, oz, pounds, or lb. *The "#" symbol is not acceptable.*
*[Nonretroactive as of January 1, 2006]*
(Amended 1995 and 2005)

**Background/Discussion:** See Appendix A, Page S&T-A27.

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

## SCL-8 Sections Throughout the Code to Include Provisions for Commercial Weigh-in-Motion Vehicle Scale Systems

***Note: This agenda item previously appeared on the Committee's agenda as Agenda Item 325-1 in 2016 and 3205-1 in 2017.***

The original purpose of this item was to recognize a higher accuracy class and appropriate requirements in Section 2.25. Weigh-In-Motion Systems Used for Vehicle Enforcement Screening Tentative Code by adding commercial and law enforcement applications. In particular, WIM vehicle scale systems capable of performing to within the tolerances specified for a higher accuracy class would be permitted for use in commercial applications and for highway law enforcement. The WIM Task Group (TG), however, agreed in 2016 that it would be more appropriate to address these higher accuracy WIM systems by proposing changes to Section 2.20. Scales Code, which remains the current effort of the TG.

**Source:**
Rinstrum, Inc. and Right Weigh Innovations (2016)

**Purpose:**
Recognize commercial Weigh-in-Motion vehicle scale systems.

**Item under Consideration:**
Amend NIST Handbook 44 Scales Code as follows:

**S.1. Design of Indicating and Recording Elements and of Recorded Representations.**

.
.
.

**S.1.1.1. Digital Indicating Elements.**

(a) A digital zero indication shall represent a balance condition that is within ± ½ the value of the scale division.

*(b) A digital indicating device shall either automatically maintain a "center-of-zero" condition to ± ¼ scale division or less, or have an auxiliary or supplemental "center-of-zero" indicator that defines a zero-balance condition to ± ¼ of a scale division or less. A "center-of-zero" indication may operate when zero is indicated for gross and/or net mode(s).*
*[Nonretroactive as of January 1, 1993]*

**(a) Weigh-in-Motion Vehicle Scales Zero or Ready Indication.**

**(1) Provision shall be made to indicate or record either a zero or ready condition.**

**A zero or ready condition may be indicated by other than a continuous digital zero indication, provided that an effective automatic means is provided to inhibit a measuring operation when the device is in an out-of-zero or non-ready condition.**

(Amended 1992 ~~and~~ 2008**, and 20XX**)

. . .

**S.1.8. Computing Scales.**

. . .

**S.1.8.6. Values to be Recorded, Weigh-In-Motion Vehicle Scales. – At a minimum, the following values shall be printed and/or stored electronically for each vehicle weighment:**

**(a) lane identification (required if more than one lane at the site has the ability to weigh a vehicle in motion);**

**(b) weight and sequence of each axle;**

**(c) total vehicle weight;**

**(d) time and date.**

**(Added 20XX)**

. . .

**S.1.14. Weigh-In-Motion Vehicle Scale: Operational Limitation. - A weigh-in-motion vehicle scale shall not provide a weight indication or recorded representation if any operational limitation is exceeded.**

**(Added 20XX)**

. . .

**S.2. Design of Balance, Tare, Level, Damping, and Arresting Mechanisms.**

**S.2.1. Zero-Load Adjustment.**

**S.2.1.1. General.** – A scale shall be equipped with means by which the zero-load balance may be adjusted. Any loose material used for this purpose shall be enclosed so that it cannot shift in position and alter the balance condition of the scale.

Except for an initial zero-setting mechanism, an automatic zero adjustment outside the limits specified in S.2.1.3. Scales Equipped with an Automatic Zero-Tracking Mechanism is prohibited.
(Amended 2010)

**S.2.1.2. Scales used in Direct Sales.** – A manual zero-setting mechanism (except on a digital scale with an analog zero-adjustment mechanism with a range of not greater than one scale division) shall be operable or accessible only by a tool outside of and entirely separate from this mechanism, or it shall be enclosed in a cabinet. Except on Class I or II scales, a balance ball shall either meet this requirement or not itself be rotatable.

A semiautomatic zero-setting mechanism shall be operable or accessible only by a tool outside of and separate from this mechanism or it shall be enclosed in a cabinet, or it shall be operable only when the indication is stable within plus or minus:

(a) 3.0 scale divisions for scales of more than 2000 kg (5000 lb) capacity in service prior to January 1, 1981, and for all axle load, railway track, **weigh-in-motion vehicle systems**, and vehicle scales; or
**(Amended 20XX)**

(b) 1.0 scale division for all other scales.

**S.2.1.3. Scales Equipped with an Automatic Zero-Tracking Mechanism.**

**S.2.1.3.1. Automatic Zero-Tracking Mechanism for Scales Manufactured Between January 1, 1981, and January 1, 2007.** – The maximum load that can be "rezeroed," when either placed on or removed from the platform all at once under normal operating conditions, shall be for:

(a) bench, counter, and livestock scales: 0.6 scale division;

(b) vehicle, **weigh-in-motion vehicle systems**, axle load, and railway track scales: 3.0 scale divisions; and
**(Amended 20XX)**

(c) all other scales: 1.0 scale division.

(Amended 2005)

**S.2.1.3.2. Automatic Zero-Tracking Mechanism for Scales Manufactured on or after January 1, 2007.** – The maximum load that can be "rezeroed," when either placed on or removed from the platform all at once under normal operating conditions, shall be:

(a) for vehicle, **weigh-in-motion vehicle systems**, axle load, and railway track scales: 3.0 scale divisions; and

(b) for all other scales: 0.5 scale division.

(Added 2005)

. . .

**S.2.5. Damping Means.** – An automatic-indicating scale and a balance indicator shall be equipped with effective means to damp oscillations and to bring the indicating elements quickly to rest.

**S.2.5.1. Digital Indicating Elements.** – **Except for weigh-in-motion vehicle systems being operated in a dynamic mode, ~~Digital~~ digital** indicating elements equipped with recording elements shall be equipped with effective means to permit the recording of weight values only when the indication is stable within plus or minus:
**(Amended 20XX)**

(a) 3.0 scale divisions for scales of more than 2000 kg (5000 lb) capacity in service prior to January 1, 1981, hopper (other than grain hopper) scales with a capacity exceeding 22 000 kg (50 000 lb), and for all vehicle, axle load, livestock, and railway track scales; and

(b) 1.0 scale division for all other scales.

The values recorded shall be within applicable tolerances.

(Amended 1995)

. . .

**N.7. Weigh-in-Motion Vehicle Scale.**

**N.7.1. Static Testing. – A Weigh-in-Motion Vehicle Scale shall be tested statically, whenever possible, using field standard weights / test loads in accordance with Table 4, uniformly distributed on the scale platform. Additionally, for scale platforms with a length of less than 4 feet a test load not greater than one half of section capacity shall be positioned between the centerline and left and right side respectively. Scale platforms with a length of 4 feet or greater shall be tested in accordance with N.1.3.3.1.**
**Class IIIL acceptance and maintenance tolerance as shown in Table 6. shall apply.**

**N.7.2. Dynamic Testing. – The Dynamic test for a Weigh-in-Motion-Vehicle Scale shall simulate the normal intended use as closely as possible i.e. test as used. The minimum test shall consist of a vehicle(s), loaded with known field standards, dynamically weighed three consecutive times. The known field standards should then be unloaded and three additional dynamic weighments of the empty vehicle(s) should be recorded. Additionally, for scale platform widths greater than 11 feet, at least one of the loaded vehicle runs and empty vehicle runs shall be made near the left edge and right edge of the scale platform respectively. Class IIIL maintenance tolerance as shown in Table 6. shall apply to the known field test standards load minus the calculated value (loaded weight – unloaded weight = calculated value) the Table 6 tolerance values shall be based on the value of the known test load.**

**(Added 20XX)**

. . .

**T.N.3. Tolerance Values.**

. . .

**T.N.3.X. Tolerances for Weigh-in-Motion Vehicle Scales. –**

**T.N.3.X.1. Static Weighing. -Acceptance tolerance shall be one-half maintenance tolerance**

**T.N.3.X.2 Dynamic Weighing. - Acceptance tolerance shall be the same as the maintenance tolerance shown in Table 6. Maintenance Tolerances.**
**(Added 20XX)**

. . .

**UR.1. Selection Requirements.** – Equipment shall be suitable for the service in which it is used with respect to elements of its design, including but not limited to, its capacity, number of scale divisions, value of the scale division or verification scale division, minimum capacity, and computing capability.[1]

.
.
.

**UR.1.6. Recording Element, Class III L Weigh-In-Motion Vehicle Scales. – Class III L Weigh-In-Motion Vehicle Scales must be equipped with a recording element.**
**(Added 20XX)**

.
.
.

**UR.2.6. Approaches.**

***UR.2.6.1. Vehicle Scales.*** *– On the entrance and exit end(s) of a vehicle scale, there shall be a straight approach as follows:*

*(a) the width at least the width of the platform,*

*(b) the length at least one-half the length of the platform but not required to be more than 12 m (40 ft), and*

*(c) not less than 3 m (10 ft) of any approach adjacent to the platform shall be in the same plane as the platform. Any slope in the remaining portion of the approach shall ensure (1) ease of vehicle access, (2) ease for testing purposes, and (3) drainage away from the scale.*

*In addition to (a), (b), and (c), scales installed in any one location for a period of six months or more shall have not less than 3 m (10 ft) of any approach adjacent to the platform constructed of concrete or similar durable material to ensure that this portion remains smooth and level and in the same plane as the platform; however, grating of sufficient strength to withstand all loads equal to the concentrated load capacity of the scale may be installed in this portion.*
*[Nonretroactive as of January 1, 1976]*

(Amended 1977, 1983, 1993, 2006, and 2010)

**UR.2.6.2. Axle-Load Scales.** – At each end of an axle-load scale there shall be a straight paved approach in the same plane as the platform. The approaches shall be the same width as the platform and of sufficient length to insure the level positioning of vehicles during weight determinations.

**UR.2.6.3. Weigh-in-Motion Vehicle Scales. - At each end of a Weigh-in-Motion Vehicle Scale there shall be a straight approach in the same plane as the platform. The approaches shall be the same width as the platform and of sufficient length to insure the level positioning of vehicles during weight determinations. Both approaches shall be made of concrete or similar durable material (e.g., steel).**
**(Added 20XX)**

.
.
.

[1] Purchasers and users of scales such as railway track, hopper, and vehicle scales should be aware of possible additional requirements for the design and installation of such devices.

(Footnote Added 1995)

**UR.3.2. Maximum Load.** – A scale shall not be used to weigh a load of more than the nominal capacity of the scale.

**UR.3.2.1. Maximum Loading for Vehicle Scales.** – A vehicle scale shall not be used to weigh loads exceeding the maximum load capacity of its span as specified in Table UR.3.2.1. Span Maximum Load.

(Added 1996)

**Note: UR.3.2.1. is not applicable to Weigh-In-Motion Vehicle Scales.**
**(Added 20XX)**

. . .

**UR.3.3. Single-Draft Vehicle Weighing.** A vehicle or a coupled-vehicle combination shall be commercially weighed on a vehicle scale only as a single draft. That is, the total weight of such a vehicle or combination shall not be determined by adding together the results obtained by separately and not simultaneously weighing each end of such vehicle or individual elements of such coupled combination. However, the weight of:

(a) a coupled combination may be determined by uncoupling the various elements (tractor, semitrailer, trailer), weighing each unit separately as a single draft, and adding together the results; or

(b) a vehicle or coupled-vehicle combination may be determined by adding together the weights obtained while all individual elements are resting simultaneously on more than one scale platform.

**Note:** This paragraph does not apply to **weigh-in-motion vehicle scales,** highway-law-enforcement scales and scales used for the collection of statistical data.
(Added 1992) **(Amended 20XX)**

. . .

**UR.3.7. Minimum Load on a Vehicle Scale or Weigh-in-Motion Vehicle Scale.** – A vehicle scale **or weigh-in-motion vehicle scale** shall not be used to weigh net loads smaller than:

(a) 10 d when weighing scrap material for recycling or weighing refuse materials at landfills and transfer stations; and

(b) 50 d for all other weighing.

As used in this paragraph, scrap materials for recycling shall be limited to ferrous metals, paper (including cardboard), textiles, plastic, and glass.
(Amended 1988, 1992, ~~and~~ 2006**, and 20XX**)

. . .

**UR.3.9. Use of Manual Weight Entries.** – Manual gross or net weight entries are permitted for use in the following applications only when:

(a) a point-of-sale system interfaced with a scale is giving credit for a weighed item;

(b) an item is pre-weighed on a legal for trade scale and marked with the correct net weight;

(c) a device or system is generating labels for standard weight packages;

(d) postal scales or weight classifiers are generating manifests for packages to be picked up at a later time; or

(e) livestock and vehicle scale **or weigh-in-motion vehicle scale** systems **that** generate weight tickets to correct erroneous tickets.

(Added 1992) (Amended 2000 ~~and~~ 2004**, and 20XX**)

**Background/Discussion:** See Appendix A, Page S&T-A32.

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

## ABW – AUTOMATIC BULK WEIGHING SYSTEMS

### ABW-3 D A. Application, S Specifications, N. Notes, UR. User Requirements

**Source:**
Kansas (2016)

**Purpose:**
Modernize the ABWS code to more fully the reflect the types of systems in use and technology available while still maintaining the safeguards of the current code.

**Item under Consideration:**
*NOTE: This proposal was updated by the submitter in October 2017 for consideration at the 2018 Interim Meeting. The previous version is included in the Background/Discussion of this item in Appendix A.*

Amend NIST Handbook 44 Automatic Bulk Weighing Systems Code as follows:

**A. Application**

**A.1. General.** – This code applies to ~~**automatic bulk**~~ weighing systems, ~~**that is, weighing systems**~~ **capable of** ~~**adapted to the automatic**~~ **automatically** weighing ~~**of a commodity in**~~ successive drafts of **a commodity without operator intervention.** ~~**predetermined amounts automatically recording the no-load and loaded weight values and accumulating the net weight of each draft.**~~
(Amended 1987 **and 20XX**)

**S. Specifications**

**S.1. Design of Indicating and Recording Elements and Recorded Representations.**

**S.1.1. Zero Indication.** – ~~**Provisions**~~ **An automatic bulk weighing system** shall ~~**be made to**~~ indicate and record a no-load reference value and, if the no-load reference value is a zero value indication, to indicate and record an out-of-balance condition on both sides of zero.
**(Amended 20XX)**

.
.
.

**S.1.5. Recording Sequence.** – ~~**Provision**~~ **An automatic bulk weighing system** shall ~~**be made so that**~~ **indicate** all weight values ~~**are indicated**~~ until ~~**the completion of the**~~ recording of the indicated value **is completed**.

**(Amended 20XX)**

**S.1.6. Provision for Sealing Adjustable Components on Electronic Devices.** – Provision shall be made for applying a security seal in a manner that requires the security seal to be broken before an adjustment can be made to any component affecting the performance of the device.

**S.1.7. No Load Reference Values – An automatic bulk weighing system shall indicate and record weight values with no load in the load-receiving element. No load reference values must be recorded at a point in time when there is no product flow into or out of the load receiving element. Systems may be designed to stop operating if a no load reference value falls outside of user designated parameters. If this feature is designed into the system then the no load reference value indicated when the system is stopped must be recorded, an alarm must activate, weighing must be inhibited, and some type of operator intervention must be required to restart the system after it is stopped.**
**(Added 20XX)**

**S.1.8. Loaded Weight Values – An automatic bulk weighing system shall indicate and record loaded weight values for each weighment.**
**(Added 20XX)**

**S.1.9. Net Weight Values – An automatic bulk weighing system shall calculate and record net weight for each weighment.**
**(Added 20XX)**

**S.1.10. Net Weight Accumulation – An automatic bulk weighing system shall accumulate and record the sum of all net weight values for all weighments performed during a weighing process.**
**(Added 20XX)**

**S.3. Interlocks and ~~Gate Control~~Product Flow Control.**

**S.3.1. ~~Gate Position~~Product Flow Control.** – **~~Provision~~ An automatic bulk weighing system** shall **~~be made to~~** clearly indicate to the operator **product flow status** **~~the position of the gates leading directly~~** to and from the **~~weigh hopper~~** **load receiving element. Many types of equipment can be used to control the flow of product into and out of a load receiving element automatically including but not limited to gates, conveyors, augers, robots, pipes, tubes, elevators, buckets, etc.**
**(Amended 20XX)**

**S.3.2. Interlocks.** – Each automatic bulk weighing system shall have operating interlocks to provide for the following:

(a) Product cannot be cycled and weighed if the weight recording element is disconnected or subjected to a power loss.

(b) **can only** **~~cannot print~~ record** a weight if **~~either of the gates~~ equipment controlling product flow to or from the load-receiving element is in a condition which prevents product entering or leaving the load receiving element.** **~~leading directly to or from the weigh hopper is open.~~**

(c) A "low paper" sensor, when provided, is activated.

(d) The system will operate only in the proper sequence in all modes of operation.

(e) When an overfill alarm is activated, the system shall indicate and record an overfill condition.

(Amended 1993 **and 20XX**)

**S.3.3. Overfill ~~Sensor~~And Interference Detection.**

(a) **An automatic bulk weighing system must have a means to detect when ~~The~~ the ~~weigh hopper~~ load-receiving element ~~shall be equipped with an~~ is** overfill**ed. When an overfill condition exists ~~sensor which will cause the feed~~ product flow to the load receiving element must be stopped, ~~gate to close~~ an alarm must activate**, **~~activate an alarm, and inhibit~~** weighing **must be inhibited** until the overfill condition has been corrected**, and some type of operator intervention must be required to restart the system**. **An alarm could be many things including a flashing light, siren, horn, flashing computer screen, etc. The intent of an alarm is to make the operator aware there is a problem which needs corrected.**
(Added 1993) **(Amended 20XX)**

*(b)* **~~If the system is equipped with a~~ Downstream storage devices and other equipment, permanent or temporary, ~~lower garner or surge bin, that garner shall also~~ which have the potential to interfere with weighment when overfilled or not functioning properly must have a means to prevent interference. When interference exist the system must stop, an alarm must activate, product flow must stop, weighing must be inhibited until the interference has been corrected, and some type of operator intervention is required to restart the system. ~~be equipped with an overfill sensor which will cause the gate of the weigh hopper to remain open, activate an alarm, and inhibit weighing until the overfill condition has been corrected.~~**
*[Nonretroactive as of January 1, 1998]*
(Amended 1997 **and 20XX**)

## N. Notes

**N.1. Testing Procedures**.

**N.1.1. Test Weights.** – The increasing load test shall be conducted using test weights equal to at least 10 % of the capacity of the system:

(a) on automatic ~~**grain**~~ bulk ~~**-**~~ weighing systems installed after January 1, 1984 **used to weigh grain**; and

(b) on other automatic bulk-weighing systems installed after January 1, 1986.
(Amended 1987**, and 20XX)**

## UR. User Requirements

**UR.4. System Modification.** – **Components of ~~The~~ the automatic bulk** weighing system, shall not be modified except when the modification has been approved by a competent engineering authority, preferably that of the engineering department of the manufacturer of the scale, and the official with statutory authority having jurisdiction over the scale.
(Amended 1991 **and 20XX**)

**Background/Discussion:** See Appendix A, Page S&T-A35.

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

### ABW-4 A. Application and Appendix D: Definitions – batching system

**Source:**
Richard Suiter Consulting (2018)

**Purpose:**
Withdraw the current proposal in S&T Item 3200-1 to modify NIST Handbook 44 Section 2.20. Scales, paragraph S.1.2. to recognize batching systems and to add a definition for batching scale to Appendix D – Definitions, replacing it with a proposal to place an exception for batching systems in NIST Handbook 44 Section 2.22. Automatic Bulk Weighing Systems and to add a definition for batching system to Appendix D – Definitions.

**Item under Consideration:**
Amend NIST Handbook 44 Automatic Bulk Weighing Systems Code as follows:

**A.2. Exceptions. – This code does not apply to batching systems.**

**A.~~2~~3. Additional Code Requirements.** – In addition to the requirements of this code, Automatic Bulk Weighing Systems shall meet the requirements of Section 1.10. General Code.

And Appendix D: Definitions

**batching system. – One in which raw materials are proportioned in pre-determined quantities by weight and/or liquid measure for inclusion in a finished product. 2.22. 3.36.**

**Background/Discussion:** See Appendix A, Page S&T-A41.

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

## LMD – LIQUID MEASURING DEVICES

### LMD-2 D S.1.6.7. Recorded Representation, S.1.6.8. Recorded Representations for Transactions Where a Post-Delivery Discount(s) is Provided. and UR.3.4. Printed Ticket

**Source:**
Morrow County, Carroll County and Stark County, OH (2017)

**Purpose:**
Require that printed receipts declare an alpha or numeric pump designation that coincides with the dispensing device used for a specific transaction.

**Item under Consideration:**
Amend NIST Handbook 44 Liquid Measuring Devices Code as follows:

Note: The item under Consideration was modified by the developer for 2018.

***S.1.6.7. Recorded Representations. –*** *Except for fleet sales and other price contract sales and for transactions where a post-delivery discount is provided, a printed receipt providing the following information shall be available through a built-in or separate recording element for all transactions conducted with point-of-sale systems or devices activated by debit cards, credit cards, and/or cash:*

*(a) the total volume of the delivery;* *****

*(b) the unit price;* *****

*(c) the total computed price;* ****and**** ~~***and***~~

*(d) the product identity by name, symbol, abbreviation, or code number.* **** and***

***(e) the dispenser designation by either an alpha or numerical description. *****
*******[Nonretroactive as of January 1, 1986]* *****[Nonretroactive as of January 1, 2021***
(Added 1985) (Amended 1997, 2012, ~~and~~ 2014 **and 2019**)

**S.1.6.8. Recorded Representations for Transactions Where a Post-Delivery Discount(s) is Provided. –** Except for fleet sales and other price contract sales, a printed receipt providing the following information shall be available through a built-in or separate recording element that is part of the system for transactions involving a post-delivery discount:

(a) the product identity by name, symbol, abbreviation, or code number;

(b) transaction information as shown on the dispenser at the end of the delivery and prior to any post-delivery discount(s), including the:

(1) total volume of the delivery;

(2) unit price; and

(3) total computed price of the fuel sale.

(c) an itemization of the post-delivery discounts to the unit price; ~~and~~

(e) the final total price of the fuel sale after all post-delivery discounts are applied~~.~~**, and**

(f) ***The dispenser designation by either an alpha or numeric description.***
(Added 2012) (Amended 2014**and 2019**) [***Nonretroactive as of January 1, 2021]***

And

**UR.3.4. Printed Ticket.** - The total price, the total volume of the delivery, ~~and~~ the price per liter or gallon, ***and a corresponding alpha or numeric dispenser designation**** shall be shown, either printed by the device or in clear hand script, on any printed ticket issued by a device and containing any one of these values.
(Amended 2001 **and 2019**) ****(Retroactive January 1, 2021)***

**Background/Discussion:** See Appendix A, Page S&T-A42.

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

# LPG – LPG AND ANHYDROUS AMMONIA LIQUID-MEASURING DEVICES

## LPG-3 S.2.5. Zero-Set-Back Interlock, Stationary and Vehicle Mounted Meters, Electronic

**Source:**
Maryland (2018)

**Purpose:**
To align the LPG code with the VTM code for electronic registers/indicators used in stationary and mobile applications.

**Item under Consideration:**
Amend NIST Handbook 44 LPG and Anhydrous Ammonia Liquid-Measuring Devices Code as follows:

**S.2.5.** ***Zero-Set-Back Interlock, Stationary and Vehicle Mounted Meters, Electronic. - A device shall be so constructed that after an individual or multiple deliveries at one location have been completed, an automatic interlock system shall engage to prevent a subsequent delivery until the indicating and, if equipped, recording elements have been returned to their zero position. For individual deliveries, if there is no product flow for three minutes the transaction must be completed before additional product flow is allowed. The 3-minute timeout shall be a sealable feature on an indicator.***
***(Added 20XX) (Nonretroactive as of 20XX)***

***S.2.6~~5~~. Zero-Set-Back Interlock for Stationary Retail Motor-Fuel Devices.*** *– A device shall be constructed so that:*

.

.

.

Renumber remaining paragraphs

**Background/Discussion:** See Appendix A, Page S&T-A44.

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

## LPG-4 D N.3. Test Drafts.

*Note: This item was modified by the developer on September 8, 2017. It previously appeared on the Committee's agenda as 332-2 in 2015 and 332-5 in 2016.*

**Source:**
Endress + Hauser Flowtec AG USA (2015)

**Purpose:**
Allow transfer standard meters to be used to test and place into service dispensers and delivery system flow meters.

**Item under Consideration:**
Amend NIST Handbook 44 LPG and Anhydrous Ammonia Liquid-Measuring Devices as follows:

**N.3. Test Drafts.**

**N.3.1 Minimum Test -** Test drafts should be equal to at least the amount delivered by the device in 1 minute at its normal discharge rate.
(Amended 1982)

**N.3.2. Field Reference Standard Meter Test. – The minimum quantity for any test draft shall be equal to or greater than the amount delivered in one minute at the flow rate being tested.**
**(Added 20XX)**

**Background/Discussion:** See Appendix A, Page S&T-A45.

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

## LPG-5 D N.4.1.2. Repeatability Tests and N.4.2.4. Repeatability Tests for Type Evaluation

**Source:**
Ross Andersen, Retired (2017)

**Purpose:**
Address differences between Handbook44 and Publication 14 practices for LPG Liquid Meter testing.

**Item under Consideration:**
Amend NIST Handbook 44 Liquid Measuring Devices Code as follows:

**N.4.1.2. Repeatability Tests. –** Tests for repeatability should include a minimum of three consecutive test drafts of approximately the same size and be conducted under controlled conditions where variations in factors such as temperature, pressure, and flow rate are reduced to the extent that they will not affect the results obtained. **Repeatability tests shall be based on the uncompensated volume, e.g. with the temperature compensator deactivated. Both field tests and type evaluation tests shall be run at flow rates consistent with normal tests as specified in N.4.1.**
**(Amended 20XX)**

Add a new Paragraph N.4.2.4. as follows:

**N.4.2.4. Repeatability Tests for Type Evaluation. – Tests for repeatability should include a minimum of three consecutive test drafts of approximately the same size and be conducted under controlled conditions where variations in factors such as temperature, pressure, and flow rate are reduced to the extent that they will not affect the results obtained. Repeatability tests shall be based on the uncompensated volume, e.g. with the temperature compensator deactivated. Type evaluation tests shall be run at flow rates consistent with special tests as specified in N.4.2., N.4.2.1., N.4.2.2., or N.4.2.3. as appropriate.**
**(Added 20XX)**

**Background/Discussion:** See Appendix A, Page S&T-A51.

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

# WTR – WATER METERS

## WTR-2 S.2.1. Provision for Sealing and Table S.2.1. Categories of Device and Methods of Sealing

**Source:**
California (2018)

**Purpose:**
Standardize sealing requirements in the Water Meter Code with the LMD code.

**Item under Consideration:**
Amend NIST Handbook 44 Water Meters Code as follows:

**S.2.1. Provision for Sealing.** – Adequate provision shall be made for **an approved means of security (e.g., data change audit trail) or** for **physically** applying ~~a~~ security seal~~s~~ in such a manner that **requires the security seal to be broken before an** ~~no~~ adjustment or interchange can be made of:

(a) any measuring **or indicating** element; ~~**and**~~

(b) any adjustable element for controlling delivery rate when such rate tends to affect the accuracy of deliveries; **and**

**(c) any metrological parameter that will affect the metrological integrity of the device or system.**

**When applicable,** the adjusting mechanism shall be readily accessible for purposes of affixing a security seal.

**(Amended 20XX)**

***[Audit trails shall use the format set forth in Table S.2.1.]****

| ***Table S.2.1.*** <br><br> ***Categories of Device and Methods of Sealing*** | |
|---|---|
| ***Categories of Device*** | ***Methods of Sealing*** |
| ***Category 1: No remote configuration capability.*** | ***Seal by physical seal or two event counters: one for calibration parameters and one for configuration parameters.*** |
| ***Category 2: Remote configuration capability, but access is controlled by physical hardware.*** <br><br> ***The device shall clearly indicate that it is in the remote configuration mode and record such message if capable of printing in this mode or shall not operate while in this mode.*** | ***[The hardware enabling access for remote communication must be on-site. The hardware must be sealed using a physical seal or an event counter for calibration parameters and an event counter for configuration parameters. The event counters may be located either at the individual measuring device or at the system controller; however, an adequate number of counters must be provided to monitor the calibration and configuration parameters of the individual devices at a location. If the counters are located in the system controller rather than at the individual device, means must be provided to generate a hard copy of the information through an on-site device.]**** <br><br> ***[*Nonretroactive as of January 1, 1996]*** |
| ***Category 3: Remote configuration capability access may be unlimited or controlled through a software switch (e.g., password).*** <br><br> ***[Nonretroactive as of January 1, 1995]*** <br><br> ***The device shall clearly indicate that it is in the remote configuration mode and record such message if capable of printing in this mode or shall not operate while in this mode.*** <br><br> ***[Nonretroactive as of January 1, 2001]*** | ***An event logger is required in the device; it must include an event counter (000 to 999), the parameter ID, the date and time of the change, and the new value of the parameter. A printed copy of the information must be available on demand through the device or through another on-site device. The information may also be available electronically. The event logger shall have a capacity to retain records equal to 10 times the number of sealable parameters in the device, but not more than 1000 records are required. (Note: Does not require 1000 changes to be stored for each parameter.)*** |

**(Added 20XX)**

**Background/Discussion:** See Appendix A, Page S&T-A53.

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

# MFM – MASS FLOW METERS

## MFM-2 D N.3. Test Drafts.

*Note: This item was modified by the developer on September 8, 2017. It previously appeared on the Committee's agenda as 337-3 in 2015 and 2016.*

**Source:**
Endress + Hauser Flowtec AG USA (2015)

**Purpose:**
Allow transfer standard meters to be used to test and place into service dispensers and delivery system flow meters.

**Item under Consideration:**
Amend NIST Handbook 44 Mass Flow Meters Code as follows:

**N.3. Test Drafts. –**

**N.3.1 Minimum Test -** The minimum test shall be one test draft at the maximum flow rate of the installation and one test draft at the minimum flow rate. More tests may be performed at these or other flow rates. (See T.3. Repeatability.)
(Amended 1982 **and 20XX)**)

**N.3.2. Field Reference Standard Meter Test. – The minimum quantity for any test draft shall be equal to or greater than the amount delivered in one minute at the flow rate being tested.**
**(Added 20XX)**

**Background/Discussion:** See Appendix A, Page S&T-A54.

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

# TXI – TAXIMETERS

## TXI-1 S.1.2.2. Distance Mechanism and S.1.5.3. Distance Not Recording.

**Source:**
NIST OWM (2018)

**Purpose:**
Amend the effective date for the nonretroactive status for two paragraphs (S.1.2.2. Distance Mechanism, and S.1.5.3. Distance not Recording) to allow a reasonable time period for taximeter manufacturers to bring their devices in compliance.

**Item under Consideration:**
Amend NIST Handbook 44, Taximeters Code as follows:

***S.1.2.2. Distance Mechanism.*** *– Means shall be provided on all taximeters designed to calculate fare based on a combination of time elapsed and/or distance traveled to enable the vehicle operator to render the distance mechanism either operative or inoperative with respect to the fare-indicating mechanism. [Nonretroactive as of January 1, ~~2018~~ 2020]*

(Added 2017)

***S.1.5.3. Distance Not Recording.*** *– When a taximeter is set for fare registration with the distance mechanism inoperative, it shall indicate "Distance Not Recording" or an equivalent expression. [Nonretroactive as of January 1, ~~2018~~ 2020]*
(Added 2017)

**Background/Discussion:** See Appendix A, Page S&T-A57.

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

# OTH – OTHER ITEMS

## OTH-5 D Electric Watthour Meters Code under Development

**Source:**
NIST OWM (2016)

**Purpose:**

1) Make the weights and measures community aware of work being done within the U.S. National Work Group on Electric Vehicle Fueling and Submetering to develop proposed requirements for electric watthour meters used in submeter applications in residences and businesses;
2) Encourage participation in this work by interested regulatory officials, manufacturers, and users of electric submeters.
3) Allow an opportunity for the USNWG to provide regular updates to the S&T Committee and the weights and measures community on the progress of this work;
4) Allow the USWNG to vet specific proposals as input is needed.

**Item under Consideration:**

Create a "Developing Item" for inclusion on the NCWM S&T Committee Agenda where progress of the USNWG can be reported as it develops legal metrology requirements for electric watthour meters and continues work to develop test procedures and test equipment standards. The following narrative is proposed for this item:

In 2012, NIST OWM formed the U.S. National Working Group on Electric Vehicle Fueling and Submetering to develop proposed requirements for commercial electricity-measuring devices (including those used in sub-metering electricity at residential and business locations and those used to measure and sell electricity dispensed as a vehicle fuel) and to ensure that the prescribed methodologies and standards facilitate measurements that are traceable to the International System of Units (SI).

In 2013, the NCWM adopted changes recommended by the USNWG to the NIST Handbook 130 requirements for the Method of Sale of Commodities to specify the method of sale for electric vehicle refueling. At the 2015 NCWM Annual Meeting, the NCWM adopted NIST Handbook 44 Section 3.40 Electric Vehicle Refueling Systems developed by the USNWG.

This Developing Item is included on the Committee's agenda (and a corresponding item is proposed for inclusion on the L&R Committee Agenda) to keep the weights and measures community apprised of USNWG current projects, including the following:

- The USNWG continues to develop recommended test procedures for inclusion in a new EPO 30 for Electric Vehicle Refueling Equipment along with proposed requirements for field test standards.

- The USWNG is continuing work to develop a proposed code for electricity-measuring devices used in sub-metering electricity at residential and business locations. This does not include metering systems under the jurisdiction of public utilities. The USNWG hopes to have a draft code for consideration by the community in the 2016-2107 NCWM cycle.

The USNWG will provide regular updates on the progress of this work and welcomes input from the community.

For additional information, contact USNWG Chairman Tina Butcher at tbutcher@nist.gov or 301-975-2196 or Technical Advisor, Juana Williams at juana.williams@nist.gov or 301-975-3989

**Background/Discussion:** See Appendix A, Page S&T-A58.

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

## OTH-6 Appendix D – Definitions: Batch (Batching)

**Source:**
Kansas (2018)

**Purpose:**
To clarify when batching is a metrologically significant event.

**Item under Consideration:**
Amend NIST Handbook 44, Appendix D. Definitions and follows:

**batch (batching). - The separate weighment or measurement of two or more products consecutively, using the same load receiving or measuring element, without emptying or re-zeroing the device between weighments or measurements. Batching may be performed by many kinds of devices including but not limited to Scales and Automatic Bulk Weighing Systems.**
**(Added 20XX)**

**Background/Discussion:** See Appendix A, Page S&T-A60.

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

Mr. Ivan Hankins, Iowa | Committee Chair
Mr. Joseph Eccleston, Maryland | Member
Ms. Rachelle Miller, Wisconsin | Member
Mr. Josh Nelson, Oregon | Member
Mr. Brad Bachelder, Maine | Member
Mr. Luciano Burtini, Measurement Canada | Canadian Technical Advisor
Mr. Rick Harshman, NIST, OWM | NIST Technical Advisor
Mr. Darrell Flocken, NCWM | NTEP Technical Advisor

**Specifications and Tolerances Committee**

# Appendix A

# Background/Discussion on Agenda Items of the Specifications and Tolerances (S&T) Committee

## Subject Series List

## Table A
## Table of Contents

## Table B
## Glossary of Acronyms and Terms

| Acronym | Term | Acronym | Term |
|---|---|---|---|
| ABWS | Automatic Bulk Weighing System | NEWMA | Northeastern Weights and Measures Association |
| AAR | Association of American Railroads | NIST | National Institute of Standards and Technology |
| API | American Petroleum Institute | NTEP | National Type Evaluation Program |
| CNG | Compressed Natural Gas | OIML | International Organization of Legal Metrology |
| CWMA | Central Weights and Measures Association | OWM | Office of Weights and Measures |
| EPO | Examination Procedure Outline | RMFD | Retail Motor Fuel Dispenser |
| FHWA | Federal Highway Administration | S&T | Specifications and Tolerances |
| GMM | Grain Moisture Meter | SD | Secure Digital |
| GPS | Global Positioning System | SI | International System of Units |
| HB | Handbook | SMA | Scale Manufactures Association |
| LMD | Liquid Measuring Devices | SWMA | Southern Weights and Measures Association |
| LNG | Liquefied Natural Gas | TC | Technical Committee |
| LPG | Liquefied Petroleum Gas | USNWG | U.S. National Work Group |
| MMA | Meter Manufacturers Association | VTM | Vehicle Tank Meter |
| MDMD | Multiple Dimension Measuring Device | WIM | Weigh-in-Motion |
| NCWM | National Conference on Weights and Measures | WWMA | Western Weights and Measures Association |

**Details of All Items**
*(In order by Reference Key)*

## BLOCK 1 ITEMS (B1) MANIFOLD FLUSH SYSTEMS

### B1: GEN-1 G-S.2. Facilitation of Fraud.
### B1: VTM-1 S.3. Diversion of Measured Liquid and UR.2.6. Clearing the Discharge Hose.

**Background/Discussion:**
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 so the driver can 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 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. I have also seen these systems installed on trucks that are for sale where the seller notes the system as a selling point. I 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 that are fabricated onsite. These systems are often difficult to distinguish and installed in an inconspicuous manner. While we have 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 W&Ms. This lack of uniformity is problematic for both W&Ms and private industry.

The submitter is not aware of any jurisdictions that prohibit such systems and believes they are valuable for safety. The submitter also does not think it would be appropriate to require multiple meters and hoses due to cost and safety concerns for driver safety. It would be acceptable to have the meter automatically print a flush ticket, but the submitter questions whether this can be done, especially for systems that have been in the marketplace for many years.

**Regional Association Comments:**
NEWMA: The submitter provided a presentation on this item. This item has been fully developed by the submitter and the committee believes it should move forward as an Informational item.

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

Return to Proposal

## BLOCK 2 ITEMS (B2) DIVISION SIZE AND TOLERANCES FOR IN-MOTION RAILWAY SYSTEMS

### B2: SCL-1 D Table 3, Parameters for Accuracy Classes
### B2: SCL-2 D T.N.3.6. Coupled-in-Motion Railroad Weighing Systems

These items have been assigned to the submitter for further development. For more information or to provide comment, please contact:

Dr. Anthony Pruiti
Meridian Engineers Pty Ltd.
Unit 9/50 Howe St.
Osborne Park, WA 6017
AUSTRIA
PH: +61 8 9278 6000
F: +61 8 9278 6001
anthony.pruiti@meridianengineers.com.au

**Background/Discussion:**
The content of NIST Handbook 44 has been driven by the ongoing development of weighing devices. This is quite apparent when viewed for the purpose of certifying in-motion rail weighing systems. These devices have been developed from static, platform-type scales that utilize one or more very accurate load cells, and the Handbook seems to assume that the devices will also be used for static reference weighing.

Meridian Engineers asks that you consider their in-motion weighing rail weighing system, which has been in production and development for 15 years. It already has trade approval in Australia (National Measurement Institute) and the EU (National Measurement Regulation Office) and they are now looking to gain NTEP Certification.

The product utilizes what they refer to as bolt-on transducers, which make the rail a pseudo load cell. They are not designed to be used as a conventional load cell that can be connected to a standard load cell indicator. They are only designed for the end application i.e. coupled, in-motion train weighing. Furthermore, their product is not attempting to perform static reference weighing.

Because they bolt their transducers onto existing railway line, they cannot change its sectional properties to increase performance or accuracy. Also, their transducers do not carry zero-shift compensation because the overall system is constantly digitally zeroing the system typically after every 4$^{th}$ axle weighed. Hence there has been no need to incorporate conventional zero-shift compensation into the manufacturing of our transducers.

In this application, the errors from the quality of the rolling stock, the track foundation condition, as well as how smoothly the locomotive drives across the system are significantly higher than the individual class IIIL permissible errors.

All this means the accuracy of their “load cell” would struggle to meet Class IIIL requirements as they currently stand. Yet the accuracy of their system is as good as any system designed with Class IIIL load cells for coupled in-motion weighing.

The requirement to have load cells pass IIIL accuracy requirements for coupled in-motion train weighing is not appropriate and restricts the design of the final system to more conventional platform style systems, which is detrimental to innovation. This requirement is too stringent and they would argue that the final accuracy of the complete system should dictate how accurate the load cells need to be.

At the 2017 NCWM Interim Meeting, the Committee grouped Agenda Items 3200-4 and 3200-8 together and took comments on these items simultaneously because it considered them related.

Mr. Richard Suiter (Richard Suiter Consulting) gave a short presentation on behalf of Meridian Engineers Pty Ltd. that provided an indication how the Meridian Engineering equipment functioned and showed some of the test data that Meridian had collected to support the changes proposed. It was stated that the proposed changes would harmonize the tolerances for in-motion railroad weighing systems in NIST HB 44 with those in OIML R 106 Automatic Rail-Weighbridges. Mr. Suiter acknowledged that the impact of changing the HB 44 tolerances is not yet fully known and needed further study. Mr. Anthony Pruiti (Meridian Engineers Pty Ltd.) stated he intended to continue working on this item and planned to have more information available at the upcoming NCWM Annual meeting.

Mrs. Tina Butcher (NIST OWM) noted that while establishing different accuracy classes for weighing devices would not be unprecedented, if this were done specifically for coupled-in-motion railroad weighing systems as proposed, each accuracy class would also need to define the application of the weighing systems assigned that accuracy class. She further noted that while OWM could envision this possibly being done, it questioned the need for it and wished to defer opinion until more information has been made known justifying the reason.

Mr. Rafael Jimenez (Association of American Railroad Transportation Technology Center) commented that the AAR takes no position on this item and that the American Railway Engineering and Maintenance-of-Way Association's (AREMA) Committee 34 planned to review and analyze the test data that had been collected on the Meridian systems.

Mr. Russ Vires (Mettler-Toledo, LLC), speaking on behalf of the SMA, stated that the SMA takes no position on this group of items. This is a significant change to the code and the impacts are not fully known. The proposal introduces new classes and changes the concept of a scale being comprised of an NTEP-certified indicator, a weighing/load receiving element, and load cell(s). The SMA looks forward to the review and input from other interested stakeholders.

A regulatory official from Oregon cautioned on "relaxing" the tolerances and the negative impact that such action would have on customers.

Mr. Steve Beitzel (Systems Associates, Inc.) stated that the railroad weighing systems offered by Systems Associates can consistently pass the current tolerances in HB 44. Adoption of these proposals would create an unfair playing field and an imbalance in the market. He said that when Systems Associates installs a railroad weighing system outside the US, it tests those weighing systems using U.S. tolerances.

It was noted during the Committee's work session that this item did not appear on the regional agendas of the S&T Committee in three of the four regional weights and measures association meetings. In consideration of the comments received during the open hearings, the Committee agreed to assign a "Developing" status to the two items in this group.

At the Committee's 2017 NCWM Annual Meeting open hearings, the Committee grouped Agenda Items 3200-4 and 3200-8 together and took comments on the two items at the same time. A rather lengthy presentation was given by the item's submitter, Mr. Anthony Pruiti (Meridian Engineers Pty Ltd.), which provided an explanation for the changes being proposed and Meridian's perspective supporting the changes. The changes, if adopted, would align the performance requirements corresponding to coupled-in-motion (CIM) railroad weighing systems in HB 44 with those in OIML R 106 Automatic rail-weighbridges. OIML R106 provides multiple accuracy classes for CIM railroad weighing, whereas, HB 44 currently provides only a single accuracy class. The Committee received few comments after Mr. Pruiti's presentation, which were mostly questions being repeated that had been asked recently at one or more of the recent regional W&M association meetings. For example, questions asking, "If this scale in

not capable of meeting HB 44 (Table 3) Parameters for Accuracy Classes, what can of worms will we be opening? What will be changed?" and, "Will this be beneficial, and does this tighten accuracy classes?"

The Committee agreed to maintain the developing status of this item based on the comments received.

**Regional Association Comments:**

WWMA: The Committee is recommending withdrawal of this item because the changes are so substantial and the effect on other areas of the code and devices that are currently in use, that more research is needed to help the Committee understand why the current code needs this change.

SWMA: The Committee heard comments jointly on the following items in a "batch": 3200-4 Table 3, Parameters for Accuracy Classes and 3200-8 T.N.3.6. Coupled-in-Motion Railroad Weighing Systems.

Russ Vires, speaking on behalf of SMA, stated that SMA opposes both these items. Mr. Vires noted that the proposed changes seem rather simple, but would have considerable impact, including changes to the effective number of divisions and increasing the tolerance. Richard Suiter, speaking as a representative of the submitter (Meridian Engineers), gave a presentation on the proposal and noted that a key goal is to obtain harmonization with international requirements. Mr. Suiter noted that the effective error resulting from the proposed increase in tolerance is minimized by the large size of the overall load. The idea of establishing tolerances based on commodities would be a very different approach from our current system, but it may be something that needs to be considered in the future. Others expressed concerns over that philosophy. Given the diverse opinions on this issue, the Committee recommends this item remain Developing.

CWMA: The SMA opposes 3200-4. They believe this is an unnecessary change to the code. The committee believes the product has merit, but it should be treated the same as similar devices which are NTEP certified and currently in use. The committee believes the current language of this would show favoritism to devices which may not be able to pass NTEP evaluation. The CWMA recommended that this be a Developing item.

NEWMA: Eric Golden (SMA) the SMA opposes this item as an unnecessary change to the code. A comment was heard that this item should be addressed in the test notes. The committee believes this item could be further developed by the submitter and recommended that it be a Developing item.

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

Return to Proposal

## BLOCK 3 ITEMS (B3) SUMMING OF INDIVISUAL WEIGHING/MEASURING ELEMENTS

**B3: SCL-3 D Table 3, Parameters for Accuracy Classes**
**B3: OTH-1 D Appendix A – Fundamental Considerations: Section 4.4. General Considerations**

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

Ross Andersen
rjandersen12@gmail.com

**Background/Discussion:**
The submitter modified the proposal to amend Appendix A after the WWMA meeting. The item under consideration now represents the revised version. The original that was presented at WWMA was as follows:

4**.4. General Considerations.** – **Code requirements are applied only to a single device or system, unless specifically stated in the code. The official may encounter equipment where the digital indications from more than one device are electronically summed. This may be done in multiple ways. Each device may have its own indicating element and the sum is indicated on a separate, associated indicator which is interfaced directly with each device (i.e. a computer or console via cable or even bluetooth wireless communication). The indicating elements of the individual devices may be enclosed in a single housing, with separate indicators for each device and a separate indicator for the electronic sum. An electronic sum of measured values from multiple devices is not subject to code requirements, except that it be mathematically correct, i.e. add up to the proper sum - See General Code G-S.5.2.2.(e).**

The simpler the commercial device, the fewer are the specification requirements affecting it, and the more easily and quickly can adequate inspection be made. As mechanical complexity increases, however, inspection becomes increasingly important and more time consuming, because the opportunities for the existence of faulty conditions are multiplied. It is on the relatively complex device, too, that the official must be on the alert to discover any modification that may have been made by an operator that might adversely affect the proper functioning of the device.

It is essential for the officials to familiarize themselves with the design and operating characteristics of the devices that he inspects and tests. Such knowledge can be obtained from the catalogs and advertising literature of device manufacturers, from trained service persons and plant engineers, from observation of the operations performed by service persons when reconditioning equipment in the field, and from a study of the devices themselves.

Inspection should include any auxiliary equipment and general conditions external to the device that may affect its performance characteristics. In order to prolong the life of the equipment and forestall rejection, inspection should also include observation of the general maintenance of the device and of the proper functioning of all required elements. The official should look for worn or weakened mechanical parts, leaks in volumetric equipment, or elements in need of cleaning.

The submitter provided the following comments:

Some are now coming to understand that the NCWM made a mistake in 1990 in interpreting how we apply the code requirements to the three-platform, three-indicator truck scale with a fourth summed indication. In any suggestion that a Code should be changed or reinterpreted, there is an unstated requirement that there must be some conflict that needs resolution. Often the difficult part is in just identifying the conflict or in finding the right question to expose the conflict to others and, in doing so, possibly point to the resolution. Some might think there is no conflict and there is no issue, but I must disagree.

What stands out on this issue to me is the huge divide between the public sector and private sector on this issue. It was black and white in 1989, good guys vs the bad guys. The public sector, me included, saw the issue one way while the scale industry almost unilaterally saw it differently. As I think back over my career, I find it hard to find many issues where consensus between the two sides eluded the NCWM as it did for this issue. In my experience, the scale industry works toward consensus as earnestly as the public sector. If there is no consensus here, this should bother us all and encourage us to try to understand why.

If we ask the question on our current issue, as Henry Oppermann has, it goes like this: How do we apply the Scales Code requirements to a three-platform scale with three independent weight indications and a fourth indication of the sum of the three independent platforms? His answer follows his logic of the "duck test."

Quoting him, "if a scale looks like truck scale, operates like a truck scale, and weights trucks, then it is a truck scale."

It is important to note that a parallel issue was on the 2016 S&T agenda dealing with the v(min) requirement for these three-platform scales with three independent indicators. However, in dealing with this small part of the larger issue, the Committee has chosen ignored the larger issue for now. In my testimony at the 2016 interim meetings, I pointed out that the v(min) change would result in a mixed state of being. Part of our interpretation would treat the three scales as three i.e. for v(min), but treat them as one for all other requirements. Does this make sense?

I see an immediate problem here, as Henry's quote is based on thinking from 1989, and I'll suggest much earlier, pre-1986 to be exact. We can see this in Tables 7b. and 7a. in the Scales Code. These tables deal with selection requirements for unmarked scales and marked scales. Table 7b. reflects that pre-1986 thought process where the application of the unmarked device determined what technical and performance requirements would apply. This is the model implied in Henry's comment and in the thought process we see from the S&T Committee as it wrestled with this issue in 1990. Quoting from page 157 of the 1990 S&T final Report: "The classification of a scale or weighing system into an accuracy class should be based upon its application and method of use, not on the design of the device." In the same paragraph the report also notes, "The significance of this interpretation is that not only must each independent weighing device meet the requirements of Handbook 44, but the entire weighing system must meet all requirements that would apply <u>if the device were a single scale</u>." (emphasis added) This was voted on and approved by the public sector voters of the NCWM with strong (non-voting) opposition from the scale industry.

Looking at that last statement in the S&T report today, does it even make sense? Table 7a. made a radical departure from the pre-1986 way of thinking. Under the "New" Scales Code which took effect January 1, 1986, the technical and performance requirements were determined by the class designation that was chosen and marked on the device by the manufacturer. In the wording of the table, it is a typical application of the class. Thus, the requirements apply based on the class designation as marked by the manufacturer and the device is adapted to the application. To me this contradicts the S&T conclusions in 1990.

I'm suggesting that a "duck test" is not valid for marked devices. For example, there is no single set of requirements for a marked truck scale. By this I mean one can use a class III or a class IIIL scale to weigh trucks and the requirements are therefore very different. This was impossible to imagine prior to 1986 under the "Old" Scales Code. It is the manufacturer, in the design and production phases, who determines and marks the class. It is the marked class that determines which technical requirements will be applied to the device, and this is done before it leaves the plant. The code recognizes that the manufacturer has no means to limit the application once the purchaser buys the device. Whether a device is suitable is a separate question and has a separate requirement, i.e. G-UR.1.

I believe the "duck test" is not valid for the entire Handbook. For me the critical issue we have to address is how to apply code requirements in general. The simple direct answer is, we apply code requirements to <u>a</u> device. That is how the requirements are written, in the singular. Why is this singularity important? The answer lies in unstated general principles in Handbook 44 which we can elicit by asking, "How do we measure quantities of things in commerce, generally?" By generally, I mean across all Codes. My answer is that the Codes clearly allow multiple solutions to that question. I'll state this more specifically:

A commodity exchanged in commerce may be measured:

A. as a single draft measured using a single measuring instrument.
B. as the sum of measurements of sub-parts of the whole using multiple drafts on a single measuring instrument.
C. as the sum of measurements of sub-parts of the whole using multiple drafts of multiple measuring instruments.

It must be noted that the instrument used in any of the options A through C, must be suitable for service when measuring the whole or the sub-part in conformance with G-UR.1. For the purposes of this discussion we will stipulate that all measuring instruments involved are suitable for service, whether measuring the whole or the sub-part. For example, all weighments are stipulated to be greater than the recommended minimum load in Table 8 or liquid quantities in conformance with G-UR.1.3.

A couple of examples might help. I don't think I need to illustrate option A, as it is the most common solution. Option B can be seen with an Automatic Bulk Weighing system which operates by summing multiple drafts weighed on the same scale to provide a total weight of the whole commodity. But I could also do option B using VTM's. I could make multiple deliveries from a single VTM unit to fill a large customer order, i.e. larger than the tank capacity of the single VTM. Alternatively, I could fill that order using drafts from multiple VTM units, option C.

Our assumption in accepting each of these options is that the sum of measurements from multiple compliant instruments is de facto compliant. In fact, the reason that we use multiple drafts in the first place is that the total will probably exceed our ability to verify the quantity of the whole, even if we wanted to! Going back to our examples, how could we verify, after the fact, that the 1,000 tons of grain loaded on a barge from an ABWS system with a 50,000 lb capacity scale is accurate? That's at least 40 drafts.

What becomes very clear to me in the general case is that the technical and performance requirements are applied to the individual device without regard to the summed total. It seems this summed total has always been the crux of the issue. Does this summed indication now link the three independent platforms with their independent indication in a way that makes them one device for legal purposes? This is what the S&T Committee decided in 1990. Some would continue to say yes and some would say no. However, there is the law to consider. By law, I mean the general rules of construction of legal requirements. In construction, we must not be arbitrary and capricious. I believe those that say the three scales are one scale are being arbitrary and capricious.

To see how this is so, consider what UR.3.3. Single-Draft Weighing means. Below is the current HB44 text.

**UR.3.3. Single-Draft Vehicle Weighing.** – A vehicle or a coupled-vehicle combination shall be commercially weighed on a vehicle scale only as a single draft. That is, the total weight of such a vehicle or combination shall not be determined by adding together the results obtained by separately and not simultaneously weighing each end of such vehicle or individual elements of such coupled combination. However, the weight of:

(a) a coupled combination may be determined by uncoupling the various elements (tractor, semitrailer, trailer), weighing each unit separately as a single draft, and adding together the results; or

(b) a vehicle or coupled-vehicle combination may be determined by adding together the weights obtained while all individual elements are resting simultaneously on more than one scale platform.

The first sentence makes it clear that this is not a general provision as it limits the scope of the requirement to "a vehicle or a coupled-vehicle combination." It now goes on to say that any entity fitting one of those two descriptions shall be weighed as a single draft. Note that this is option A from the general case above. The paragraph goes on to provide more explanation of what single-draft means.

Then we come to a "However," indicating there are viable alternatives to the single-draft requirement. Alternative (a) allows the coupled combination to be divided into sub-parts that are weighed separately and the weight of the coupled combination is found by summing the individual weights of the sub-parts. Alternative (b) says that a vehicle or a coupled combination may be suspended simultaneously on more than one scale and the weight is found by summing the indications of the multiple scales.

We might think that alternative (a) is option B from the general case, and alternative (b) is option C. However, closer reading will show that is not the case. Look carefully at the wording of alternatives (a) and (b). You cannot equate (a) with option B since (a) does not limit you to a single scale. You might assume that the multiple parts would be weighed on the same scale, but the code does not stipulate that. To do that the code would have to add the words, "on the same scale," i.e. …. weighing each unit separately on the same scale, and adding together the results;" What I'm pointing out is that (a) as it is now written allows either general option B or C. By this I am considering the case where there are multiple scales available at the site. Each of those scales might have capacity 200,000 x 20 lb. For example, think about one of those three component trucks (tractor, trailer, and pup). Alternative (a) allows you to uncouple and weigh the three sub-parts on three scales, two scales, or one scale in full compliance with the code.

Now it becomes clear that UR.3.3. is addressing the real issue with weighing large vehicles and coupled-vehicle combinations, and that is shifting loads and coupler interactions. In alternative (a) you eliminate both interferences by isolating each part on its own scale. In alternative (b) by supporting the vehicle or combination on multiple scales, any shift in the load or coupler interaction cancels out. If load shift or couple interference reduce the weight on one platform it increases it on another. Of critical importance, the three-platform scale, that is the focus of this discussion, is an application of (b) where the load is supported simultaneously on more than one platform and the individual indications of the three scales are summed to get a total. There is no other way to describe what is happening since the total indication is, in fact, a sum of the weights from the three separate platforms. Also of critical importance, there should be no expectation whatsoever that the sum valued obtained in alternative (a) will be identical to alternative (b).

However, getting back to the question about three scales or one, it should now be clear that the Handbook clearly allows summed indications from multiple devices using options B or C. If the S&T statement is correct, then the code requirements must be applied across two scales or three scales in the example of multiple scales at a site. Thus, the three, one-hundred ton scales have a combined 30,000 divisions according to that interpretation. This would virtually preclude having multiple scales at the same site as they might be used to weight a single coupled-vehicle combination in pieces. Even going to 50 lb divisions still puts them out of compliance. Also, you have to consider the shift test requirements, which now require agreement of sections across all three scales!

Finally, we have to consider other cases of three independent scale platforms configured to weigh trucks. In case one, each platform has a stand-alone independent indicator and the three indications are manually summed by the operator. In case two, each platform has an individual indicator but all three indicators are housed in a single enclosure. Again, the summing is done manually by the operator. In both cases the three independent instruments remain independent under the 1990 decision. This is what I mean by arbitrary and capricious.

Now suppose I can weigh a coupled-vehicle combination on three platforms with three separate indicators and manually add the indications to obtain a total weight for the combination. As I understand the 1990 decision, those three scales do not have to meet requirements like the number of scale divisions extended across all three scales. That extension only applies it there is a single weight display for the three scale indications and a fourth electronic indication for the sum. The results obtained are absolutely identical in function (adding manually on paper or having the system add them up) yet you are applying different requirements to the three scales depending on whether you are doing it manually or electronically. Isn't that being blatantly arbitrary and capricious?

Move over to the VTM example, and the three VTM units used to fill that order, must those three meters be treated as one meter, think about repeatability tests. It doesn't make sense for scales, nor does it make sense for any of the other codes. Thus, I argue that options B and C allow the summing of multiple devices without forcing them to be considered one instrument for applying code requirements. I believe the HB needs to say that explicitly to avoid confusion.

I offer one additional item of support. I found reference that this issue has been raised internationally. Sections of the 2009 WELMEC guide to Non-Automatic Weighing Instruments addresses this issue quite clearly (see pertinent sections on the final pages of this document). Point 3.1.16. in the Guide addresses the same issues as UR.3.3. where multiple platforms are used. The applications coincide with those I expressed in this discussion paper. Also, I believe point 3.1.54. addresses the use of multiple axle-load scales to weigh a vehicle. It also supports the conclusion that the individual axle-load scales do not become a single instrument for compliance purposes. In extension, if 3.1.54. does not apply MPE (tolerances) to the summed indication, it also does not extend other technical requirements such as v(min) [which the NCWM has addressed], n(max), shift test, etc.

The fundamental Considerations change is necessary to spell out clearly that code requirements do not extend across multiple devices unless specifically stated. A good example is the application of the code to wheel-load weighers designated as and used in pairs. For those scales designated as pairs, many authorities apply the tolerances only the combined indication of the pair. None of the other requirements applicable to the wheel-load weigher is affected by this exception. For example, the combined number of divisions for the pair is not limited to 1,200 as in Table 3. Other requirements like identification markings, rules for indicators, zero load adjustments, etc., remain applicable only to the individual wheel-load weigher and not to the pair.

The addition to G-S.5.2.2. is necessary since you can't write requirements into the Fundamental Considerations. That section is there to help understand how to apply what is written in the Codes. You must have a specification that the electronic sum be mathematically correct to reference if there is non-compliance. That is: readings from three scales of 107, 206, and 98 must result in an electronic sum of 411.

Note 4 in Table 3 has to be changed, since the last two sentences address these instances of multiple independent scales and reflect the 1990 decision. The removal of the last sentence removes the summed indicator from consideration under the classification system as discussed above, since the summed indication is not a directly measured quantity and is not subject to class requirements. The summed indication is also not subject of requirements to n(max), tolerances, etc. When this last sentence is removed, it makes the next to last sentence unnecessary. Since each of the independent scales are already covered under the general provisions of the Table.

There is a small side issue regarding multiple devices using option C where the division size is not the same for all the devices. The general principle, i.e., that summing the indications from compliant devices is a valid way to measure a commodity, does not necessarily require that division sizes of the individual devices be identical. Note that you might want to apply UR.1.3. to printed records from the three scales. However, the new Fundamental Considerations paragraph exempts the summed indication since code requirements do not apply to the summed indication except the mathematical correctness. Also, the summed indication is a sum not a representation of a scale division. It is just a sum of the values obtained from the individual compliant devices. The individual weights are also required to be shown on any record of the transaction. While the different division sizes may offend our sensibilities a little bit, on what objective basis can we say it violates the general principle, i.e. the sum of multiple compliant measurements is also de facto compliant. It is this compilation of original sources for the sum and the sum that provides the transparency for the transaction. Note the WELMEC reference indicates this is the position taken by many internationally.

I can think of another possible situation in the case of multiple ABWS systems. Suppose you are loading to a single barge from two sources where the two ABWS scales have different division sizes. The scale controller interfaced to the two scales now can print each of the weighments from each of the two scales and a single total for the entire transaction. The sum need only be mathematically correct since it is a mathematical sum of independent, compliant weighments.

From May 2009 version of WELMEC Directive 90/384/EEC: Common Application Non-Automatic Weighing Instruments (available at www.welmec.org/latest/guides/)

### 3.1.2 Calculated weight (Meeting 10, Decision 10)

Where the indication represents an actual determination of the weight then the indication must respect the error allowance and be presented in the correct format.

When gross, net and tare are printed together, weight may be calculated from two actual determinations of weight. In the case of a multi-interval instrument it would be allowed to print a calculated value with the least significant digit which need not be rounded to the relevant scale interval.

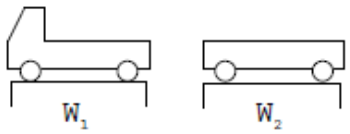
Any printout of the calculated weight values should be identified as calculated weight values.

(See also Sections 3.1.16 and 3.1.54)

### 3.1.16 Combined and multi-plate weighbridges (Meeting 14, Point 4, Meeting 15, Point 2 and Meeting 18, Point 9)

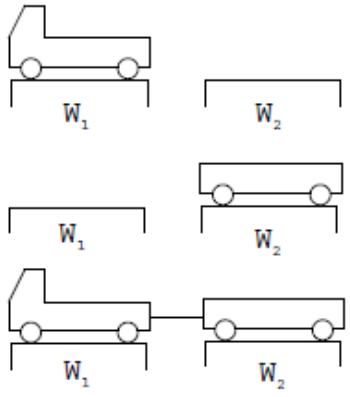
This concerns weight obtained by using adjacent weighbridges. Acceptable solutions, with examples, are shown below:

Two weighbridges, each with its own indicator:




$W_1$ = 30 t x 10 kg
$W_2$ = 30 t x 10 kg
(Two indicators; simultaneous indication necessary)
Calculated weight 60 t x 10 kg
(mpe does not apply to calculated weight)

Multi-plate weighbridge with one indicator:




$W_1$ = 30 t x 10 kg

$W_2$ = 30 t x 10 kg

$W_{1+2}$ = 60 t x 20 kg

$W_{1+2}$ is a weighing range (Compatibility of modules and mpe must be satisfied for it)

(See also Sections 3.1.2 and 3.1.54)

### 3.1.54 Vehicle weighing by summation of individual wheel load NAWIs ("axle weighers") (Meeting 25, Point 9)

If the total weight of a vehicle is calculated automatically by summing the individual weight values produced by individual wheel load NAWIs ("axle weighers"), the system is not to be regarded as being one single NAWI. The mpe does not apply to calculated weight.

(See also Sections 3.1.2 and 3.1.6)

### 3.1.6 Load cells

(Note that throughout this guide, "load cells" refers to analogue load cells rather than digital load cells unless stated otherwise.)

At the 2017 NCWM Interim Meeting, the Committee grouped Agenda Items 3100-1, 3200-5 and 3600-2 together and took comments on these items simultaneously because it considered them related. See Agenda Item 3100-1 for a summary of the comments received and the resulting actions taken by the Committee on these items at the 2017 NCWM Interim Meeting.

At the 2017 NCWM Annual meeting, S & T Committee Chair Dr. Matt Curran (FL) stated the Committee will only hear comments from the submitter on developing items at the S & T Committee open hearings. The Committee grouped Agenda Items 3100-1, 3200-5, and 3600-2 together because it considered them related. Mr. Ross Andersen (NY-retired) spoke on the updates to this group of items as the submitter. See Agenda Item 3100-1 for a summary of the updated information provided by him. The Committee agreed to carryover this group of items on its agenda as Developing items to allow Mr. Andersen the opportunity to further develop and garner support for his proposals.

**Regional Association Comments:**
WWMA: The committee considered this item along with 3200-5. The committee recommends that both items be withdrawn. The committee agreed that each independent scale in a system with multiple scales and a summing indicator as well as the combined scale system must meet the requirements of handbook 44.

SWMA: The Committee heard a recorded presentation (with accompanying PowerPoint slides) from the submitter. There were multiple comments indicating a lack of understanding of what the proposal was trying to accomplish. Most states report treating this as three scales when the systems are tested. The committee agreed that each independent scale in a system with multiple scales and a summing indicator as well as the combined scale system must meet the requirements of handbook 44. The committee recommends that all three items in this "block" be withdrawn.

CWMA: A PowerPoint presentation was submitted by Ross Anderson. The SMA opposes this item, as they feel it would restrict the use of multiple scales operating using internal resolution to create an additional scale that provides the total weight value. This proposal would not address the total scope of the changes necessary to eliminate ambiguity in the code. Rice Lake believes the presentation was incorrect on several points. Changes in this area would require a more comprehensive approach. The committee agrees with the submitter that the Handbook is flawed, and the committee feels this item needs to be further developed. The CWMA recommended that this item be a Developing item.

NEWMA: This item was considered as part of Batch 1 including items 3100-1, 3200-5 and 3600-2. Ross Andersen (submitter) gave a presentation on the items. Eric Golden commented that the SMA opposed the items and recommended further development. Ross Anderson recommended that 3100-1 be withdrawn and that 3200-5 and 3600-2 be moved forward as developing items. The committee heard comments in support of this and recommended that 3100-1 be Withdrawn while 3200-5 and 3600-2 be Developing items.

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

Return to Proposal

## BLOCK 4 ITEMS (B4) TERMINOLOGY FOR TESTING STANDARDS

**B4: SCL-4** **N.2. Verification (Testing) Standards**
**B4: ABW-1** **N.2. Verification (Testing) Standards**
**B4: AWS-1** **N.1.3. Verification (Testing) Standards, N.3.1. Official Tests, UR.4. Testing Standards**
**B4: CLM-1** **N.3.2. Transfer Standard Test and T.3. On Tests Using Transfer Standards**
**B4: CDL-1** **N.3.2. Transfer Standard Test, T.3. On Tests Using Transfer Standards**
**B4: HGM-1** **N.4.1. Master Meter (Transfer) Standard Test, T.4. Tolerance Application on Test Using Transfer Standard Test Method**
**B4: GMM-1** **Air Oven Reference Method Transfer Standards, N.1.3. Meter to Like-Type Meter Method Transfer Standards and 5.56(b): N.1.1. Transfer Standards, T. Tolerances[1]**
**B4: LVS-1** **N.2. Testing Standards**

**B4: OTH-2** **Appendix A: Fundamental Considerations, 3.2. Tolerances for Standards, 3.3. Accuracy of Standards**

**B4: OTH-3** **Appendix D – Definitions: fifth-wheel, official grain samples~~, transfer standard~~ and Standard, Field**

**Background and Discussion:**

The term transfer standard is currently defined in HB 44 as only being applicable to the Cryogenic Liquid Measuring Devices code. This definition should be removed as it is very limited in scope and the item termed a 'transfer standard' is in fact a robust working measurement standard used in field conditions, better termed and shortened to Field Standard. All instruments/devices used as a Field Standard in the testing of Weighing and Measuring Devices, regardless of nomenclature, must comply with the requirements of HB 44, Appendix A, Fundamental Considerations Associated with the Enforcement of Handbook 44 Codes, paragraph 3.2 Testing Apparatus, Adequacy. Using the term transfer standard as it is recently being applied in no way negates this requirement of adequacy and confuses the user as to the nature of the field standard being used.

Use of the single word 'standard' to signify use of a field standard can be confusing as there are a number of different meanings associated with 'standard'. It could be a documentary standard, i.e., HB 44; a primary standard used to realize the SI, i.e., Watt Balance; a laboratory reference standard used to ensure traceability of laboratory measurements to the SI, i.e., NIST calibrated laboratory standards; a laboratory check standard used to monitor the laboratory process. Use of the single word 'standard' requires that the reader understand completely the context of its use. Instead using the term Field Standard ensures that the reader understands that the item described is a robust working standard used in field conditions to ensure traceability of the subordinate measurements to the SI and leaves no ambiguity in its meaning.

Thus, the recommended changes to HB 44 align that document with the HB 130, removing ambiguity and adding clarity to the use of Field Standards for device testing.

Handbook 130 does NOT contain the term transfer standard in any location and already contains the definition and appropriate use of the term Field Standard in the following locations:

1.12. Standard, Field. – A physical standard that meets specifications and tolerances in NIST Handbook 105-series standards (or other suitable and designated standards) and is traceable to the reference or working standards through comparisons, using acceptable laboratory procedures, and used in conjunction with commercial weighing and measuring equipment. (Added 2005)

Uniform Weights and Measures Law

Section 3. Physical Standards Weights and measures that are traceable to the U.S. prototype standards supplied by the Federal Government, or approved as being satisfactory by NIST, shall be the state reference and working standards of weights and measures, and shall be maintained in such calibration as prescribed by the NIST as demonstrated through laboratory accreditation or recognition. All field standards may be prescribed by the Director and shall be verified upon their initial receipt and as often thereafter as deemed necessary by the Director. (Amended 2005)

Section 12. Powers and Duties of the Director The Director shall:

(h) verify the field standards for weights and measures used by any jurisdiction within the state, before being put into service, tested annually or as often thereafter as deemed necessary by the Director based on statistically evaluated data, and approve the same when found to be correct; (Amended 2005)

Uniform Regulation for the Voluntary Registration of Servicepersons and Service Agencies for Commercial Weighing and Measuring Devices

Section 1. Policy

For the benefit of the users, manufacturers, and distributors of commercial weighing and measuring devices, it shall be the policy of the Director of Weights and Measures, hereinafter referred to as "Director," to accept registration of (a) an individual and (b) an agency providing acceptable evidence that he, she, or it is fully qualified by training or experience to install, service, repair, or recondition a commercial weighing or measuring device; has a thorough working knowledge of all appropriate weights and measures laws, orders, rules, and regulations; and has possession of, or has available for use, and will use suitable and calibrated weights and measures field standards and testing equipment appropriate in design and adequate in amount. (An employee of the government shall not be eligible for registration.)

The Director will check the qualifications of each applicant. It will be necessary for an applicant to have available sufficient field standards and equipment (see Section 5, Minimum Equipment).

Section 9. Examination and Calibration or Certification of Standards and Testing Equipment All field standards that are used for servicing and testing weights and measures devices for which competence is registered shall be submitted to the Director for initial and subsequent verification and calibration at intervals determined by the Director. A registered serviceperson or registered service agency shall not use in servicing commercial weighing or measuring devices any field standards or testing equipment that have not been calibrated or verified by the Director. In lieu of submission of physical standards, the Director may accept calibration and/or verification reports from any laboratory that is formally accredited or recognized. The Director shall maintain a list of organizations from which the state will accept calibration reports. The state shall retain the right to periodically monitor calibration results and/or to verify field standard compliance to specifications and tolerances when field standards are initially placed into service or at any intermediate point between calibrations. (Added 1966) (Amended 1984, 1999, and 2005)

**Regional Association Comments:**

WWMA: The Committee agreed to recommend this item and all related items as developing items. The Committee identified some standards that may not be able to achieve the 1/3 standard in the Fundamental Considerations in Handbook 44. The Committee would also like some clarification as to the intent of these changes, i.e. is it the intent

to have a 105 series standard for all field standards and current transfer standards? Lastly the Committee would like the submitter to consider retaining and clarify the definition of "Transfer Standard" and perhaps expand the application of the definition to include other device codes.

SWMA: The Committee heard comments from Bob Murnane who recommended withdrawing these items and further developing them and resubmitting them. Mr. Murnane also provided written comments on these items, noting that in addition to the above items, two carryover items on the Committee's report on "transfer standards" and two new items related to this. The Committee heard from Tina Butcher (NIST OWM) who noted that OWM's goal was to attempt to align the terminology that is used in various sections of the Handbook (including the Fundamental Considerations) relative to standards used in testing. These proposals came about as a result of OWM's analysis of the two carryover items referenced by Mr. Murnane. Mrs. Butcher acknowledged that additional work may be needed, given the comments that have been heard. The Committee recommends that these items remain as Developing items.

CWMA: The committee received written statements from Seraphin asking this item be Developmental. The committee agrees this should be a Developing item.

NEWMA: A comment was heard suggesting the definition could cause issues categorizing several field standards into transfer standards when this is not always the case. The intention is a nice idea but incorrect to say that everything used in the field is a transfer standard. The committee believes this item has merit but requires further Development by the submitter.

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

Return to Proposal

## BLOCK 5 ITEMS (B5) DEFINE "FIELD REFERNCE STANDARD"

**B5: CLM-2** **N.3.2. Transfer Standard Test and T.3. On Tests Using Transfer Standards**
**B5: CDL-2** **N.3.2. Transfer Standard Test and T.3. On Tests Using Transfer Standards**
**B5: HGM-2** **N.4.1. Master Meter (Transfer) Standard Test and T.4. Tolerance Application on Test Using Transfer Standard Test Method**
**B5: OTH-4** **Appendix D – Definitions: field reference standard meter and ~~transfer standard~~**

**Background/Discussion:**
During S&T open hearings discussion in July 2017 it was pointed out that the term transfer standard which is used in the proposal to amend HB44 3.37 N.3 and 3.32 N.3 Test Drafts is incorrect. The statement made also suggested that the use of transfer standard is incorrectly used in HB44 code sections 3.34, 3.38 and 3.39. It was suggested that a more appropriate term to use is field reference standard or field reference standard meter. There is no definition in OIML G18 which supports the use of the term transfer standard. There is suggestive basis to support reference standard as it is used textually in OIML G18.

NIST has no procedural documents in place to justify the revision with a definition. The definition of transfer standard is used in code sections 3.34, 3.38 and 3.39 and that those sections do not need to change.

**Regional Association Comments:**
WWMA: The Committee has agreed to recommend that this item be Developing, recommending it be harmonized with items New 6-15 and New 24-27 as the different terms used in these new items will affect their application. The Committee believes that the terms such as "Transfer Standard", "Testing Standards", "Verification (Testing) Standards", "Field Standards", "Field Reference Standard Meter", "Master Meter", etc. in New 6-15, and New 24-27 need to be defined and possibly standardized prior to further development of this item. The Committee is also

concerned that Handbook 44 is not the appropriate place to specify the type of test equipment necessary for conducting tests.

SWMA: The Committee asked for comments on the following "batch" of items:

- New 24 - N.3.2. Transfer Standard Test and T.3. On Tests Using Transfer Standards (Cryogenics)
- New 25 - N.3.2. Transfer Standard Test and T.3. On Tests Using Transfer Standards (CO2)
- New 26 - N.4.1. Master Meter (Transfer) Standard Test and T.4. Tolerance Application on Tests Using Transfer Standards (Hydrogen)
- New 27 - Appendix D – Definitions for "field reference standard meter" and "transfer standard"

The Committee heard no specific comments on the items in this batch; however, they heard comments related to these items in conjunction with the batch of items discussed with New-6 through New-15 and Items 3302-1 and 3307-2. See those items for additional details.

The Committee supports the concept of using "master meters" (and acknowledged that other terms have been and are being proposed) for various metering applications. The Committee believes there is still confusion over the terminology and that it is difficult to review multiple items related to the same basic issue. The Committee recommends that the items in this "batch" of items be Developing items.

CWMA: The committee received written statements from Seraphin asking this item be Developing. Until data is provided and evaluated that shows that the proposed field standards can perform at the level needed for a field standard, the CWMA recommended that this be a Developing item.

NEWMA: This item is part of Batch 3 which includes items New-24 through New-27. Comments were heard on all items. A comment was heard questioning whether this should not be considered a master meter. This item has merit but the committee believes it should remain Developing at this time.

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

Return to Proposal

## BLOCK 6 ITEMS (B6) ALIGN VAPOR ELIMINATION REQUIREMENTS AMONG CODES

**B6: LPG-1 S.2.1. Vapor Elimination. (See related items New-17 and New-18)**
**B6: CLM-3 S.2.1. Vapor Elimination.**
**B6: CDL-3 S.2.1. Vapor Elimination.**

**Background/Discussion:**

In 2016, changes were made to the requirements for vapor elimination in the LPG & $NH_3$ code to make the requirement less design specific; clarify that the means provided for vapor elimination must be "effective;" and recognize that the vent line need not be rigid, provided the material chosen is effective at preventing the vent line from being obstructed. In 2017, corresponding changes were made to the Liquid-Measuring Devices Code; the Vehicle-Tank Meters Code; the Milk Meters Code; the Water Meters Code. Similar changes were made at the same time to the Mass Flow Meters Code, with some slight variations in the language to reflect that the introduction of air into the meter does not create accuracy problems for some mass flow metering systems.

In the process of reviewing the proposals submitted in 2017, the NCWM S&T Committee heard comments that similar changes should be made to align the language in the vapor/air elimination paragraphs in all the measuring codes. At the Committee's suggestion, the submitters of the 2017 item, Tina Butcher (NIST OWM) and Mr. Dmitri Karimov (Liquid Controls), prepared corresponding proposed changes to align the vapor/air elimination paragraph(s) in Sections 3.32, 3.34, and 3.38, including vetting these proposals with members of the Meter

Manufacturers Association. The Committee felt that these changes could be incorporated into the existing proposal; however, the BOD concluded that these additional changes needed to be introduced as a separate item in the next NCWM cycle. Rather than delay the items presented in 2017, the Committee decided to recommend those items for a vote and propose the remaining items for a vote in 2018. Consequently, this current proposal to modify Sections 3.32., 3.34., and 3.38. is being submitted as outlined during the 2017 Interim Meeting. Note that, although the paragraph in Section 3.32. was modified in 2016, the changes proposed to the other measuring codes in 2017 included some additional minor changes to align format and language.

The rationale for these changes is identical to that for changes already adopted in other codes. Unless someone comes forward with new information, there is no opposing argument that hasn't already been considered by the NCWM in its deliberations on previous items.

**Regional Association Comments:**
WWMA: The Committee is in agreement that these items have merit and should be carried forward as voting items.

SWMA: Mrs. Tina Butcher (NIST OWM), explained that OWM submitted these items at the request of the NCWM S&T Committee as a follow-up from items that were adopted at the 2017 NCWM Annual Meeting on the same topic. She noted that these items, as were the other items adopted in July 2017, are intended to align the language across multiple measuring codes and eliminate the reference to "rigid metal tubing" in favor of the more general language of "appropriate non-collapsible material." The Committee heard no other comments on these items and recommends they be designated as "Voting" items.

CWMA: The committee heard no comments opposing this item, and since the language is already in HB 44, the committee recommends the item be moved to voting. The committee appreciates the work of the Office of Weights & Measures on clarifying these items.

NEWMA: This item includes editorial changes and no comments were heard. The committee believes this item has been fully developed and is ready for a vote.

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

Return to Proposal

## BLOCK 7 ITEMS (B7) ADDRESS DEVICES AND SYSTEMS ADJUSTED USING A REMOVABLE DIGITAL STORAGE DEVICE

**B7: GEN-2 D G-S.8.2. Devices and Systems Adjusted Using Removable Digital Device Storage**
**B7: SCL-5 D S.1.11. Provision for Sealing.**
**B7: BCS-1 D S.5. Provision for Sealing.**
**B7: ABW-2 D S.1.6. Provision for Sealing Adjustable Components on Electronic Devices.**
**B7: AWS-2 D S.1.3. Provision for Sealing.**
**B7: LMD-1 D S.2.2. Provision for Sealing.**
**B7: VTM-2 D S.2.2. Provision for Sealing.**
**B7: LPG-2 D S.2.2. Provision for Sealing.**
**B7: HGV-1 D S.2.2. Provision for Sealing.**
**B7: CLM-4 D S.2.5. Provision for Sealing.**
**B7: MLK-1 D S.2.3. Provision for Sealing.**
**B7: WTR-1 D S.2.1. Provision for Sealing.**
**B7: MFM-1 D S.3.5. Provision for Sealing.**
**B7: CDL-4 D S.2.5. Provision for Sealing.**
**B7: HGM-3 D S.3.3. Provision for Sealing.**

**B7: EVF-1 D S.3.3. Provision for Sealing.**
**B7: TIM-1 D S.4. Provision for Sealing.**
**B7: GMM-2 D S.2.5. Provision for Sealing.**
**B7: MDM-1 D S.1.11. Provision for Sealing.**

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

Tina Butcher
NIST Office of Weights and Measures
301-975-2196
tbutcher@nist.gov

**Background/Discussion:**
The Committee initially considered a proposal from the NTEP Grain Analyzer Sector to modify the definition for "remote configuration capability" as follows:

> **remote configuration capability. –** The ability to adjust a weighing or measuring device or change its sealable parameters from or through some other device that ~~**is not**~~ **may or may not** itself **be** necessary to the operation of the weighing or measuring device or ~~**is not**~~ **may or may not be** a permanent part of that device. [2.20, 2.21, 2.24, 3.30, 3.37, 5.56(a)]
>
> (Added 1993, **Amended 20XX**)

The proposal was intended to address the use of removable digital storage devices in grain moisture meters (GGMs). Removable digital storage devices can be used in GMMs as either data transfer devices that are not necessary to the operation of the GMM or as data storage devices which are necessary to the operation of the GMM. If removable data storage devices are necessary to the operation of the device, they are not covered by the current definition of remote configuration capability in HB 44.

A USB flash drive is most likely to be used as a data transfer device. In a typical data transfer application considered by the Grain Sector, the USB flash drive is first connected to a computer with access to the GMM manufacturer's web site to download the latest grain calibrations that are then stored in the USB flash drive. The USB flash drive is removed from the computer and plugged into a USB port on the GMM. The GMM is put into remote configuration mode to copy the new grain calibration data into the GMM's internal memory. When the GMM has been returned to normal operating (measuring) mode the USB flash drive can be removed from the GMM.

Although a Secure Digital (SD) memory card could also be used as a data transfer device it is more likely to be used as a data storage device. In a typical "data storage device" application, the SD memory card stores the grain calibrations used on the GMM. The SD memory card must be plugged into an SD memory card connector on a GMM circuit card for the GMM to operate in measuring mode. To install new grain calibrations, the GMM must be turned "off" or put into a mode in which the SD memory card can be safely removed. The SD memory card can either be replaced with an SD memory card that has been programmed with the new grain calibrations or the original SD memory card can be re-programmed with the new grain calibrations in much the same way as that described in the preceding paragraph to copy new grain calibrations into a USB flash drive. In either case, the SD memory card containing the new calibrations must be installed in the GMM for the GMM to operate in measuring mode. In that regard, the SD memory card (although removable) can be considered a permanent part of the GMM in that the GMM cannot operate without it.

**Note:** In the above example SD memory card could be any removable flash memory card such as the Secure Digital Standard-Capacity, the Secure Digital High-Capacity, the Secure Digital Extended-Capacity, and the Secure Digital Input/Output, which combines input/output functions with data storage. These come in three form factors: the

original size, the mini size, and the micro size. A Memory Stick is a removable flash memory card format, launched by Sony in 1998, and is also used in general to describe the whole family of Memory Sticks. In addition to the original Memory Stick, this family includes the Memory Stick PRO, the Memory Stick Duo, the Memory Stick PRO Duo, the Memory Stick Micro, and the Memory Stick PRO-HG.

The Committee heard opposition to the proposed changes to the definition, though a number of comments indicated support for changes to adequately address security for weighing and measuring systems adjusted using removable media. Over the course of several years, multiple proposals were presented and the Grain Analyzer Sector decided to address its concerns through implementation of other requirements specific to grain analyzers. Acknowledging the need to modify sealing requirements to better address systems adjusted using removable media, OWM requested the Committee assign responsibility for this item to OWM.

At the 2015 and 2016 Interim and Annual Meetings, OWM provided updates to the Committee on its progress developing this item. Mrs. Tina Butcher (NIST OWM) noted that, after analyzing the issue, OWM was concerned that proposing modifications to the existing sealing requirements might have unintended consequences for some equipment not adjusted using this type of media. Since modifications using removable media that would remain in the device during normal use had not been envisioned when the audit trail criteria were originally developed, OWM believes that it might be best to create sealing requirements that apply more specifically to this technology. At the 2015 Annual Meeting, Tina Butcher (OWM) reported that members of its LMDP developed a draft General Code paragraph they believe will address the sealing of devices using this technology to make adjustments. The LMDP requested that this draft paragraph be included in this item to begin generating feedback to assist in further development of this item and shared the proposed approach with the Committee and NTEP Sectors.

Mrs. Butcher also noted that the LMDP plans to propose modifications to a number of the individual device codes in HB 44 to reference the new General Code sealing requirement and shared an example of such proposed changes in the Scales Code.

See the Committee's 2013 - 2016 Final Reports for additional background information and to review the different proposals considered by the Committee to address security of equipment; the metrological parameters of which can be changed by use of some form of removable digital storage device.

In January 2017, just prior to the 2017 NCWM Interim, OWM contacted the Committee to make it aware that OWM had prepared additional proposed changes that finalized the proposal. OWM asked the Committee to replace the Grain Analyzer Sector's original proposal with OWM's complete proposal (including the proposed General Code paragraph and proposed changes to specific codes), which was agreed.

At the 2017 NCWM Interim Meeting, OWM requested that this item be maintained on the Committee's 2017 agenda as either a "Developing" or "Informational" item to allow for study and comment on the proposed changes between then and the fall 2017 regional weights and measures association meetings. At that point, after considering and incorporating any changes to the proposal, OWM plans to recommend that the Committee consider recommending the proposal for adoption by the NCWM in 2018.

Mr. Russ Vires (Mettler-Toledo, LLC), speaking on behalf of the SMA, reported that the SMA is opposed to this item as it currently appears on the Committee's Interim Meeting agenda. Members of the SMA haven't had the opportunity to review OWM's most recent changes and he was therefore, unable to render an opinion on the changes.

The Committee agreed to replace the Grain Analyzer Sector's original proposal with OWM's complete proposal as shown in "Item under Consideration" in 2016 NCWM Publication 16 and assign the item a "Developing" status as recommended by OWM.

At the 2017 NCWM Annual Meeting, the Committee received an update on this item from Mrs. Tina Butcher (NIST OWM). Mrs. Butcher briefly summarized the background of this item as outlined in this item and reiterated that this method of making adjustments was not envisioned when the existing criteria for audit trails and electronic sealing

were developed in the early 1990s. OWM was concerned that attempting to modify the existing criteria for electronic sealing might inadvertently affect existing equipment which the current requirements adequately address and create overly complex requirements. OWM has developed a new proposal to address devices which are adjusted via means of removable media such as the SD card and has provided the Committee with a copy. The new proposal recommends the addition of a new General Code requirement and also recommends revisions to sealing requirements in individual, specific codes to reference the new General Code requirement. OWM circulated an initial draft to the NTEP Sectors and the community and incorporated the feedback it received.

The SMA recently reported that it opposed the item as written because of the inclusion of the term, "configuration" in proposed paragraph S.1.11.1. of the Scales Code portion of the proposal. The SMA noted that the industry-accepted definition of "configuration" includes items that should not be considered sealable. Consequently, the SMA recommended removing the text "configuration or" from paragraph S.1.11.1. as it appears in Item Under Consideration of the Committee's 2017 Interim Report for this item. OWM understands SMA's concern with respect to paragraph S.1.11.1. of the proposal and, in an attempt to address the concern, requests the Committee replace this particular paragraph in the Item Under Consideration of the Committee's 2017 Interim Report with the following:

> **S.1.11.1 Devices and Systems Adjusted Using a Removable Digital Storage Device. - For devices and systems in which the calibration or configuration parameters, as defined in Appendix D, can be changed by use of a removable digital storage device, security shall be provided for those parameters as specified in G-S.8.2.**

Assuming SMA and others concur with this change, OWM considers this item fully developed and asks the Committee and regional associations consider assigning it a voting status for the 2018 NCWM cycle. As the submitter of this item, OWM also asks the Committee to include the corresponding proposed changes to all the codes with the proposal in the "Carryover Items" to be considered by the regional associations.

Based on the comments and request received by OWM on this item, the Committee agreed to replace the text for paragraph S.1.11.1. shown in the Committee's 2017 Interim Report with that shown above and to include the additional language in its Carryover Item. These changes are reflected in the Item Under Consideration above.

**Regional Association Comments:**
WWMA: The Committee agrees with the submitter that this item is fully developed and recommends it be moved forward to the national committee as a Voting item as proposed.

SWMA: The Committee heard comments from Mrs. Tina Butcher NIST OWM, the submitter of the item. Mrs. Butcher noted that OWM took on the responsibility for this item after initial work done by the NTEP Grain Sector. OWM provided the recommendations in this item to the S&T Committee at the 2017 Annual Meeting with a recommendation that it replace the Item Under Consideration and be forwarded to the regional meetings for consideration in the upcoming cycle. The proposal recommends establishing a new paragraph in the General Code to address devices that are adjustable through use of removable digital media such as SD cards and flash drives. The proposal also recommends the addition of paragraphs in specific device codes which refer to the General Code paragraph for devices that are adjusted in this manner. This approach would, hopefully, eliminate potential conflicts with device types that are covered under existing sealing requirements and enable the current definition for "remote configuration capability" to remain intact. Russ Vires, speaking on behalf of SMA, noted that SMA has not met since the most recent recommendations presented by the submitter. Thus, SMA has no comments at this point, but will review the proposed changes at its fall meetings and provide input at that time. The Committee received no other comments on this item. The Committee noted the title of the item needs to be changed to reflect the proposals submitted to the NCWM S&T Committee in July 2017. The Committee recommends that this item be presented for a vote.

CWMA: The SMA is opposed to this as written. Their rational is the industry accepted definition of "configuration" includes items that should not be considered sealable parameters. The SMA recommends removing the text "configuration or" from paragraph S.1.11.1. The committee recommends this item to be a Developing item.

NEWMA: Eric Golden (SMA) reported that SMA opposes this item. A comment was made that the title causes confusion as it states these are Appendix D definitions when the content of the item actually proposes changes to several codes. The committee recommends this item be withdrawn.

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

Return to Proposal

# GEN – GENERAL CODE

## GEN-3 G-A.1. Commercial and Law-Enforcement Equipment. and G-S.2. Facilitation of Fraud.

**Background/Discussion:**

Given the potential financial impact to consumers and credit issuing companies Weights & Measures recognizes the need to offer more protection to both buyer and seller in these transactions. The current design of these devices offer little to no barrier to fraud through theft of credit information, as such it is our belief that the current design, in most cases, already violates G.S.2. by facilitating easy access to allow installation of these fraudulent card reading devices. Therefore, in our opinion stronger means must be implemented to decrease the potential for fraudulent activity with these devices.

The Florida Department of Agriculture and Consumer Services estimates that on average, each skimmer results in 100 counterfeit cards, each of which are used to make $1,000 in fraudulent purchases. In other words, a single skimmer typically leads to $100,000 in theft. This is a nationwide problem that causes millions of dollars in fraudulent charges to consumers, device owners and banking institutions each year. A solution can be achieved through upgraded security measures on the weighing and measuring devices that fall within the guidelines of this handbook.

One possible argument is that these preventative measures should be in User Requirements instead of in Specifications but this is intended to be a long-term solution. The State of Florida has enacted legislation to require device users to add security measures. They have found that most owner/operators have chosen to use security seals or non-standard locks on the dispensers and that 85% of the skimming equipment being found is in devices with user applied security measures. User applied security measures are not as effective as electronic security and/or unique, tamper proof locks. The current design of these devices offer little to no barrier to fraud through theft of credit information, as such it is our belief that the current design, in most cases, already violates G.S.2. by facilitating easy access to allow installation of these fraudulent card reading devices.

Manufacturers of these devices may argue that the cost to make the necessary upgrades will be prohibitive. This item is not intended to be retroactive and the cost of the additional security measures will be universal and not place any manufacturer at a competitive disadvantage. Several manufacturers of electronic security systems designed for retail motor fuel dispensers have products available and at least three new manufacturers of low cost systems have recently come into the marketplace (at least one of them is working with OEM manufacturers and the security systems are being integrated into newly manufactured dispensers).

**Regional Association Comments:**

WWMA: The committee recommends this item be a developing item. We believe that the item has merit, however we would like to see a definition of “access” i.e. what constitutes access? In addition, what is the definition of “master key, universal key, and universal tools”? We are also concerned that with this item being included in the general code, it is very broad in the devices that will be affected by this code change, and we feel that industry needs

time to vet the item in addition to a NIST OWM review. We also recommend the submitter consider the addition of a user requirement requiring the owner/operator to utilize the security features of the device. There was also a concern that this item was included under "Facilitation of Fraud" in G-S.2. because that code requirement is generally understood to be facilitation of fraud by an owner/operator rather than someone trying to gain customer information through a skimming device installed outside of the owner/operator's knowledge.

SWMA: Some think the issue may not address metrological functions and, therefore, questioned whether it falls under weights and measures jurisdiction. Others pointed out that there are other items addressed by NIST Handbook 44 which do not speak to metrologically significant functions or features. The Committee heard multiple comments indicating concerns about this issue and the need for these devices to be addressed. The Committee believes that the item has merit. Consequently, based on the comments received, the Committee thought this item needed additional input and development. However, after considering additional comments during the Committee's voting session, including comments from the submitter questioning what additional work would be needed, the Committee recommended that this be a Voting item.

CWMA: Cardinal Scales opposes the item as written, but would be open with further clarification on the methods of security (Keys) Rice Lake questions whether this falls under the scope of HB 44, because this is a security issue and not a metrological issue. The committee has heard of two other states adopting similar security methods and recommends this to be a Developing item.

NEWMA: Mike Sikula (New York State) supported the item, but was concerned about the restriction of access to prevent criminals from planting skimming devices will also prevent inspectors from easily accessing devices. Frank Green (Connecticut) added his concern to make sure access is still possible for W&M. Eric Golden (Cardinal Scales) questioned what lock is good enough in this situation. Walt Remmert (Pennsylvania) suggested there needs to be more people in the discussion to standardize the situation by protecting and granting access to W&M. Steve Giguere (Maine, submitter) stated that this was proposed for the general code intentionally to encompass all devices. Ross Andersen (Retired, NY) questioned whether weights and measures has authority for this; Facilitation of fraud vs fraud itself. Mike Sikula interpreted G-A.1. (b) as written to mean W&M officials are responsible for the fraud investigation. The committee believes the submitters have developed the item and it should move forward as an Informational item.

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

Return to Proposal

## SCL – SCALES

### SCL-6 S.1.2.2.3. Deactivation of a "d" Resolution

**Background/Discussion:**

In researching a proposal adopted by the NCWM in 2017 (the addition of Scales Code Paragraph S.1.2.2.2. Class I and II Scales Used in Direct Sales), NIST OWM discovered there have been cases in which a Class I or II scale has the provision for deactivating its displayed division "d" and, in doing so, it affected the ability for the scale to round properly. Because this rounding functionality may not be readily detected in the field, OWM is proposing a specific paragraph be added to address this concern. Having a specific requirement in the Scales Code may help manufacturers avoid costly mistakes when designing a new model of scale and may help encourage clear and understandable transactions for buyer and seller.

Rather than delaying the adoption of Paragraph S.1.2.2.2., OWM proposed submitting this follow-on proposal in the 2017-2018 NCWM cycle to address concerns identified by the S&T Committee. The S&T Committee was supportive of OWM's plan to do so.

Additional background information is provided below for reference.

Historically, Class I and II scales have been used in indirect sale applications or in direct sale applications where the buyer and seller are familiar with the weighing process and associated displays. With the increased use of Class I and II scales in direct sale applications for the sale of cannabis, weights and measures jurisdictions have reported that buyers and sellers are often confused over which increment is to be used as the basis for the transaction. That is, whether the display of the verification scale interval "e" is to be used or if the finer displayed division "d" is to be used.

In response to these concerns, in July 2017 the NCWM adopted a new paragraph under S.1.2.2. Verification Scale Interval (S.1.2.2.2. Class I and II Scales Used in Direct Sales) to require that the displayed division "d" and the verification scale interval "e" be the same. There are multiple ways in which a manufacturer can address this new requirement. For example, a scale might be designed to display only a single size of increment. As another example, a scale might be designed with a sealable feature for accessing a menu where multiple options for selecting the displayed increment can be selected, including a single increment to comply with this requirement for direct sales or both a "d" and "e" increment for applications in which the scale is used in other than direct sale applications. A third possibility is to design the scale that displays both a "d" and "e" with the option of "deactivating" the "d."

In the process of researching this proposal, NIST OWM discovered that there have been instances in which the latter option has been found. In these cases, the deactivation of the displayed division "d" resulted in the scale simply truncating its values. While it is possible that this might be discovered in routine field testing, it is more likely to be overlooked because most field officials are not testing digital scales using error weights to determine the exact amount of error. Consequently, a "round off" problem would not likely be detected. Additionally, field standard test weights in denominations small enough to use as error weights for testing Class II scales may not be readily available in the marketplace. There are General Code requirements that could be used to address improper rounding (e.g., General Code Paragraph G-S.2. Facilitation of Fraud), but these are broad and may not provide a manufacturer with enough specificity or guidance during the design phase of scale production. While the deactivation of "d" as an option is not itself inappropriate, it is not appropriate if the deactivation affects the ability of the scale to round properly.

While one current manufacturer of Class I and II doesn't provide the option for deactivating the displayed division "d," without a specific requirement to prohibit deactivating the "d" (when it affects rounding functionality), manufacturers designing new scales may not be aware of the concern.

There are General Code requirements that might be used to require that a scale properly round under any condition of use. However, the requirements are broad and the improper rounding functionality may be difficult to detect in routine field testing.

OWM contacted a representative of one current manufacturer of Class I and II scales who reported that his company's scales do not provide the feature for deactivating the displayed division "d;" the display of a single increment is addressed through the offering of a separate model of scale. It is not clear whether other manufacturer currently design their scales (or might design them in the future) to offer the "deactivation" feature and, if so, whether the feature would result in improper rounding

See also Item 3200-2 S.1.2.2. Verification Scale Interval in the NCWM S&T Committee's 2017 Interim and Final Reports.

**Regional Association Comments:**
WWMA: The Committee believes that this item has merit and is sufficiently developed to be a voting item.

SWMA: The Committee heard no comments on this item and recommends it be voting as presented.

CWMA: There was no discussion on this item and the committee believes this item should go forward as a Developing item.

NEWMA: Comments were heard on how to verify that the scale is meeting the code requirement on rounding properly. The believed method of test would require the use of 10 mg or 1 mg weights. This does not seem like a realistic field test. The committee believes that this has been developed by the submitter and further development should be done by the committee. This item has support as moving forward on the NCWM agenda as an Informational item.

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

Return to Proposal

## SCL-7 S.1.8.5. Recorded Representations, Point of Sale Systems

**Background/Discussion:**
This proposal would benefit consumers by enabling them to see at a glance that tare is being taken on the commodities they purchase. It would also educate the public about tare, and make them better and more aware consumers.

Retailers would benefit because this proposal would aid their quality control efforts behind the counter and at the cash register. Retailers would be able to see that their employees are taking tare on packages, and that the tare employees take is the appropriate tare. For example, a meat manager would be able to spot packages of 1 lb. hamburger which had been packaged on the night shift mistakenly using the tare for family packs of chicken, just by walking down the meat counter and noticing a 0.06 lb. tare on a package size that would normally have a 0.02 or 0.03 lb. tare. The manager could also spot a 0.03lb tare on packages that should have a 0.06lb tare. Either way, the manager would be able to remove the items from the shelf and make corrections before the store or its customers were harmed. The manager would also be able to re-educate the employees responsible for the error. This improved quality control and transparency would build consumer confidence in retailers' establishments. It might even reduce the time and disruption retailers experience from official package inspections.

Package checking inspections potentially could be reduced because weights and measures officials could make risk-based assessments on the need to do package checking inspections at any given location. If an official notes that gross weights or tares are visible on all random-weight packages, and that the tares seem appropriate to the package sizes, the official may be able to skip that location and focus package checking efforts on locations where tares are absent or seem inappropriate for the package sizes. That would be more efficient for both retailers and weights and measures jurisdictions.

Finally, this proposal would aid weights and measures officials investigating complaints about net contents of item by creating written proof of how much tare was taken on a given package or transaction.

Scale manufacturers will need to modify software and label and receipt designs before the non-retroactive date. Retailers with point of sale systems and packaging scales may feel pressured to update software or purchase new devices in response to consumer demand for tare information on labels and receipts. The amount of paper needed to print customer receipts may increase depending on the formatting of the information and the size of the paper being used. Some retailers may not want consumers to have this information as it will allow consumers and weights and

measures officials to hold them accountable and would be written proof tare was not taken when, and if, that happens.

During the 2017 NCWM Interim Meeting S&T Committee open hearings, Mr. Doug Musick (KS), one of three co-submitters of this item, proposed splitting the item into two separate items: Item 3200-3A and 3200-3B. He suggested Item 3200-3A contain only the changes proposed to existing Scales Code paragraph S.1.8.5. Recorded Representations, Point of Sale Systems and Item 3200-3B contain only proposed new Scales Code paragraph S.1.9.3. Recorded Representations, Random Weight Package Labels. Mr. Musick also proposed, for the sake of clarity, removing the term "gross weight" from proposed new subsection "(b)" of paragraph S.1.8.5., leaving the term "tare weight" in that subsection and assigning that subsection a non-retroactive enforcement date of January 1, 2020. Mr. Musick commented that the changes proposed to paragraph S.1.8.5., if adopted, would provide consumers the additional sales transaction information needed to determine if an adequate amount of tare was taken on weighted items.

The Committee received numerous comments in support of amending HB 44 Scales Code paragraph S.1.8.5., some of which proposed additional changes to those proposed by the submitters of the item. Mrs. Tina Butcher (NIST OWM), in presenting OWM's comments and recommendations regarding this item, emphasized the need for additional information to be provided on the receipt. She stated that it is very difficult for customers at a checkout stand to determine whether or not tare has been taken on products weighed by a store cashier in their presence on POS systems that display only a gross weight when the net weight of each package weighed is the only weight information appearing on the sales receipt. This is especially true, she said, when there are multiple items in a customer's shopping cart to be weighed. Consumers are not always able to focus their attention on the indication when individual items are being weighed and, for systems which do not display both a gross and net weight, recall those indications when reviewing a sales receipt.

Mrs. Butcher noted too, that by allowing either gross weight or tare weight to be recorded on the receipt as proposed, stores would be provided the option of selecting one method over the other. Consequently, competing stores in a given area might opt to provide different information on the receipts, thereby causing customer confusion to those customers that frequent different stores. For this reason, OWM suggested amending the proposal that the receipt provide the gross, tare, *and* net weight. As an alternative to requiring additional information be recorded on the sales receipt, OWM suggested that the Committee may wish to draft language to require the *net weight* also be displayed on the indicator of such systems and provide some future date in which these systems must comply.

Officials from several different states highlighted, in comments provided to the Committee, the need for additional information to be provided on the sales receipt to make it possible for consumers to ensure tare had been taken on items weighed at a POS checkout.

Mrs. Julie Quinn (Minnesota), co-submitter of the item, in response to OWM's suggestion to alternatively require the net weight be displayed on the indicator, stated that even if a customer is able to view the tare indication from a POS display, there still needs to be a paper trail of the recorded transaction information for enforcement purposes. She said that she was supportive of splitting the item into two parts so as not to derail moving forward with the changes proposed to paragraph S.1.8.5. She also made note of the existence of labels on packages currently being offered for sale in the marketplace, which include recorded tare values.

The Committee also received several comments in opposition to adding proposed new paragraph S.1.9.3. Recorded Representations, Random Weight Package Labels and to Agenda Item 3200-3 as a whole.

Mr. Russ Vires (Mettler-Toledo, LLC), speaking on behalf of the SMA, reported that the SMA opposes the agenda item and feels it would be too costly with little benefit.

Mrs. Butcher reported that OWM recommends deleting proposed new paragraph S.1.9.3. from the proposal because it conflicts with NIST Handbook 130 Uniform Packaging and Labeling Regulation, which requires a declaration of the "net" quantity of contents. Mrs. Butcher made note of a few additional points to consider relating to this portion of the item as follows:

- Those who package products in advance of sale often increase tare values to take into account moisture loss and good distribution practices. Thus, it cannot be determined from a tare value specified on a package how much of that value represents the packaging material and how much represents additional deduction.
- Tare values on packages cannot be enforced and do not provide indication of whether or not the declaration of net contents specified on a package is correct.
- Displaying a declaration of both gross weight and net weight on a package would confuse consumers.

Mr. Ross Andersen (NY retired) commented that he didn't see a great amount of benefit to Item 3200-3B.

Additionally, the Committee acknowledged receiving written comments from Ms. Elizabeth K. Tansing, on behalf of the Food Marketing Institute, opposing the item and requesting that the Committee withdraw it (i.e., the item as a whole).

During the Committee's work session, members of the Committee agreed, based on comments received during open hearings, to simply delete proposed new paragraph S.1.9.3. from the proposal, rather than split the agenda item into two separate items as suggested by Mr. Musick during the Committee's open hearings. Members of the Committee also agreed to amend proposed new subsection (b) of paragraph S.1.8.5. by deleting the words "gross weight or" from the text in that subsection and assigning subsection (b) a nonretroactive enforcement date of January 1, 2020. The Committee agreed to present the item, as amended by the Committee, for vote at the 2017 NCWM Annual Meeting. The following depicts the changes that were agreed and made to the proposal by the Committee at the 2017 NCWM Interim Meeting:

**S.1.8.5. Recorded Representations, Point-of-Sale Systems.** – The sales information recorded by cash registers when interfaced with a weighing element shall contain the following information for items weighed at the checkout stand:

(a) the net weight;[1]

***(b) the tare weight;[1]***

(~~b~~**c**) the unit price;[1]

(~~c~~**d**) the total price; and

(~~d~~**e**) the product class or, in a system equipped with price look-up capability, the product name or code number.

***[Non-retroactive January 1, 2020]***
**(Amended 20XX)**

[1] For devices interfaced with scales indicating in metric units, the unit price may be expressed in price per 100 grams. Weight values shall be identified by kilograms, kg, grams, g, ounces, oz, pounds, or lb. *The "#" symbol is not acceptable.*
*[Nonretroactive as of January 1, 2006]*
(Amended 1995 and 2005)

At the 2017 NCWM Annual Meeting open hearings, Ms. Elizabeth Tansing (Food Marketing Institute, hereafter FMI) reported that the FMI opposes the item. Ms. Tansing stated that all tare weights would be required on the receipt, regardless of if it were 1 or 100 weight transactions. FMI could not find one customer that wants tare printed on the receipt. The requirement would be costly to industry (e.g., increased costs for software development, employee training, and consumer education) and additional costs would be passed on to the consumer. Customers have not asked for this information. Chain and single store operators would suffer in trying to comply. In addition to the cost concern, Ms. Tansing stated that other consequences of the proposal would be more paper used in receipts and longer wait times for customers.

Mr. Russ Vires (Mettler-Toledo, LLC) speaking on behalf of the SMA reported that the SMA also opposes the item. The implementation cost would be prohibitive for industry and retailers and that cost would be passed on to consumers who would receive little or no benefit.

Mr. John Barton (NIST OWM) commented that it is extremely difficult for customers at a checkout stand to determine whether tare has been taken on packages weighed by a store cashier in their presence when the weight display of the POS system provides only an indication of the gross weight and the net weight of those same packages gets recorded on the sales receipt, which is provided to the customer after all items have been priced. Consumers are not always able to focus their attention on the indication when individual items are being weighed and recall those indications when reviewing a sales receipt. This is especially true when there are multiple items in a customer's shopping cart to be weighed. The proposed item would benefit consumers and provide more information for investigations of consumer complaints.

Mr. Tim Chesser (AR) stated he has concerns with this requirement resulting in requirements for all packages to have tare weights printed on the package label. Arkansas receives very few complaints on net weight and for these reasons Arkansas opposes this item.

Mr. Matthew Morris (Nebraska Grocers Association) opposes this item. The requirement places a burden on retailers and would be costly for consumers. Very few complaints have been received and this would create mass confusion for consumers.

Ms. Julie Quinn (MN) commented that printing tare values on POS register receipts is a tool for regulators and store managers to audit how personnel are doing with taking tares. Consumers deserve to be protected. This is a non-retroactive requirement that impacts equipment that is installed after the non-retroactive date.

One of the original submitters Mr. Doug Musick (KS) showed a video with mathematical examples of the overcharges for several produce transactions. The video highlighted how difficult it is to tell if tare was taken and if taken correctly. Mr. Musick stated that the proposed requirement is simple, inexpensive to implement, and would provide equity in the marketplace. Mr. Loren Minnich (KS) also commented on the video, stating that if customers were asked if they wanted to be charged correctly they would say "yes," regardless if they knew what the term "tare" meant. Mr. Minnich also stated that many grocers deliver products from the store to customers' homes and customers are not present during the weighment of these items to witness whether tare was taken or not during the transaction.

Mr. Bart O'Toole (NV) supports item and commented that this requirement also involves other retailers outside of grocery stores. He gave a personal example of being overcharged at a frozen yogurt store because they failed to deduct tare for cup containers.

The Committee heard numerous comments from regulatory jurisdictions and consumers in support of this item.

No additional changes were made to the proposal; however, the Committee elected to delete the reference to S.1.9.3. Recorded Representations, Random Weight Package Labels from the title of the item since the Committee had earlier agreed at the 2017 NCWM Interim Meeting to delete proposed new paragraph S.1.9.3. from the proposal and consequently, the title too should no longer appear as part of the agenda item. The Committee agreed to present the item for vote with the reference to S.1.9.3. in its title removed. During the voting session, the item failed to receive enough votes to pass and was subsequently returned to committee.

Shortly following the 2017 NCWM Annual Meeting, the Committee received a request from Kansas and Minnesota (two of the three original submitters of the item) to amend the proposal in an attempt to better clarify that "the tare weight" portion of the information to be included on the receipt is being proposed as a nonretroactive requirement. That is, the "tare weight" information on items weighed at a checkout stand would be required to be recorded on the receipts generated from POS systems that meet any of the four conditions specified in paragraph G-A.6. Nonretroactive Requirements as of the effective date of the requirement. The two states, in an effort to make clear

that the change to paragraph S.1.8.5. is nonretroactive, proposed repositioning item (b), in the list of information required to be printed, to (d) so that "the tare weight" portion of the information required would appear at the very bottom of the list and directly above the nonretroactive date proposed. The submitters also requested that the enforcement date specified in the original proposal be extended an additional two years (i.e., until 2022) in consideration of some of the concerns raised by FMI and other industry representatives during the Committee's open hearings relating to the cost of implementation and the burden the changes would impose on grocery businesses having to comply with them. The submitters reported that they had decided to extend the effective date of enforcement to allow more time so that the cost of implementation could be spread over a longer period. A final suggested change was to amend the "Purpose" section of the item in the Committee's agenda to better reflect the true intent of the proposal; that is, to provide consumers the same opportunity afforded them by other scales that are used for direct sales (e.g. a retail-computing scales used to weigh lunch meat, cheeses, etc.) to be able to easily recognize that a tare deduction for packaging material, etc., is taken on items weighed in their presence. The State of Wisconsin, upon being contacted by Kansas and Minnesota and asked to consider these changes, reported that it wished to bow out of further involvement with the item.

The Committee, in considering the changes proposed to the item and the rationale provided by the submitters for requesting them, concurred that they were appropriate. Consequently, the Committee agreed to amend the proposal and replace the text in the "Purpose Section" as requested by the submitters and recommend the item move forward as shown in Item under Consideration.

**Regional Association Comments:**
WWMA: The Committee is recommending this item to be an informational item with the following changes to the purpose and text of the item copied from Appendix A, Page S&T – A24, as agreed by the S&T Committee at the 2017 NCWM annual meeting.

SWMA: The Committee heard comments from Mrs. Tina Butcher (NIST OWM) who noted that the title of the item in the Appendix to the Committee's report still includes a reference to a part of the original proposal which would have required the tare weight to be printed on random-packed products. That portion of the proposal was removed from the proposal prior to the NCWM Annual Meeting. In addition, she noted that the submitters of the item made modifications to the proposal following the 2017 Annual Meeting. The modifications recommend extending the nonretroactive date to 2022 (rather than 2020) and moving the reference to "tare weight" to the last item in the list.

The Committee heard some comments on the proposal indicating there was some confusion about the purpose of the proposal and what specifically was being recommended. The Committee heard multiple comments, both in support of and in opposition to the proposal and consequently, recommends the item for a vote to allow the membership to decide.

CWMA: The SMA opposes this item due to the implementation costs to the manufacturers, retailers, and consumers. Iowa stated they supported the item as previously proposed, excluding the non-retroactive date. The committee believes this item has been fully developed and should be moved to a vote.

NEWMA: Eric Golden commented that the SMA opposes this item. Comments were heard on the possible confusion it could lead to. Comments were heard on withdrawing the item. Lou Sakin (Mass) believed the item had merit and recommend voting. The committee recommends this item be moved forward as an Informational Item.

Additional letters, presentations and data may have been part of the Committee's consideration. Please refer to http://www.ncwm.net/meetings/interim/publication-15 to review these documents.

Return to Proposal

## SCL-8 Sections Throughout the Code to Include Provisions for Commercial Weigh-in-Motion Vehicle Scale Systems

***Note: This agenda item previously appeared on the Committee's agenda as Agenda Item 325-1 in 2016 and 3205-1 in 2017.***

The original purpose of this item was to recognize a higher accuracy class and appropriate requirements in Section 2.25. Weigh-In-Motion Systems Used for Vehicle Enforcement Screening Tentative Code by adding commercial and law enforcement applications. In particular, WIM vehicle scale systems capable of performing to within the tolerances specified for a higher accuracy class would be permitted for use in commercial applications and for highway law enforcement. The WIM Task Group (TG), however, agreed in 2016 that it would be more appropriate to address these higher accuracy WIM systems by proposing changes to Section 2.20. Scales Code, which remains the current effort of the TG.

**Background and Discussion:**
Rinstrum and Right Weigh Innovation submitted a proposal in 2016 to modify the tentative WIM Code for Screening and Sorting. The idea was to keep all WIM applications within the same Code section of Handbook 44. Rinstrum proposed to add slow-speed devices to the existing Screening and Sorting Code with two separate applications; one for commercial legal-for-trade and one for direct law enforcement. In consideration of the changes proposed, there would be three different applications covered by the same Code, which was causing some confusion. Because of the legal-for-trade application, it was suggested that that modification probably belonged in the Scales Code.

Rinstrum manufacturers the axleWEIGHr in-motion scale, which is a slow speed WIM axle scale system capable of being able to perform to within Class IIIL maintenance tolerance, according to Rinstrum. Rinstrum has indicated that the axleWEIGHr is a niche product, which creates a new segment for axle weighing devices. The axleWEIGHr calculates the GVW and weighs individual axles while a truck crosses the scale at 1-3 MPH. Rinstrum has also indicated the most common applications for its device will be agricultural farmers, small trucking companies or manufacturers that are interested to determine GVW and axle weights before the vehicle enters the public roadway. The proposed requirements are based in part on requirements in OIML R 134, "Automatic instruments for weighing road vehicles in motion and measuring axle loads." Test data and experience at multiple test sites demonstrate this system can meet the performance requirements that are proposed.

The 2016 NCWM Interim Meeting saw Rinstrum request the NCWM Chairman form a WIM TG to bring together regulators and private sector stakeholders to discuss Weigh-In-Motion technology. Rinstrum sought a Developing status so that it could maintain ownership of the proposal and continue to work on its development.

During the 2016 NCWM Interim Meeting, Mr. John Lawn (Rinstrum, Inc.) presented a short slide presentation on a slow speed WIM system that Rinstrum, Inc., manufactures. A copy of the slides from his presentation was inserted into Appendix B of the Committee's 2016 Final Report and available from the following link:

https://www.nist.gov/pml/weights-and-measures/ncwm-2016-annual-report-sp-1212

Mr. Lawn explained that he had originally hoped the proposal could be considered for vote in 2016, but had decided to request it move forward as Developing in 2016 to allow time for Rinstrum to address some of the concerns that had been raised through the review process and to better familiarize the weights and measures community with the equipment. He also indicated that he understood the need for Rinstrum to provide data in support of their claim that the equipment is capable of conforming to the tolerances specified in the proposal. Rinstrum's plan going forward is to amend the current proposal to address all the issues and have a new proposal ready in time that it can be considered for vote in 2017.

OWM noted that the adoption of this proposal would, for the first time ever, make it permissible for WIM vehicle systems installed in the U.S. to be used not only for direct law-enforcement applications, but also for commercial applications. While encouraging the expansion of the code to recognize such applications, OWM further noted that

the proposal needs to be thoroughly vetted by all the different parties affected by the changes being proposed, including (but not necessarily limited to):

- truck weight enforcement officials;
- representatives from the judicial system;
- WIM equipment manufacturers;
- weights and measures officials;
- FHWA and other transportation officials; and
- members of the trucking industry.

OWM also identified several areas of the proposal needing additional development to include:

- The procedures developed by the WIM WG for establishing reference test loads for testing WIM systems used in law enforcement screening may not provide the level of accuracy needed (i.e., combined error and uncertainty less than one-third applicable tolerance) for testing commercial and law-enforcement WIMs given the more stringent tolerances proposed for these applications.
- Studies have shown that axle and tandem axle weights fluctuate depending on the positon of a truck on a scale. How will this be addressed in the procedures for establishing the reference test loads for testing axle and axle-groups?
- Under what conditions are officials willing to accept a single tolerance (i.e. Class IIIL Maintenance tolerance) for commercial applications?
- Why is there not an acceptance tolerance proposed? Is it because the amount of error in the WIM system is not expected to change as a result of routine, continued use?
- If a single tolerance is accepted, will this be limited to certain applications?

The Committee agreed with the submitter's request and recommended the item move forward as Developing.

In February 2016, the NCWM agreed to form a TG, at the recommendation of the Committee, to consider a proposal that would expand the new NIST Handbook 44 Weigh-In-Motion Systems Used for Vehicle Enforcement Screening – Tentative Code to also apply to commercial use. Mr. Alan Walker (FL) agreed to serve as chairman of the new TG.

The Committee received an update on this item during the 2016 NCWM Annual Meeting from Mr. John Lawn (Rinstrum, Inc.). Mr. Lawn reported that the TG had agreed that the proposal needed to be changed to separate the requirements for WIM systems used in commercial application from those used for direct enforcement. He requested that the Committee replace the proposal included in the Item Under Consideration with a synopsis, which he offered to prepare and provide to the Committee given that the current proposal was no longer being considered.

In consideration of Mr. Lawn's request to do so, the Committee agreed to replace the proposal in the Item Under Consideration with the synopsis to be developed by him. The submitter's original proposal was replaced following the 2016 NCWM Annual Meeting and is available for review, as is the synopsis developed by Mr. Lawn, in the Committee's 2016 Final Report from the following link:

http://nvlpubs.nist.gov/nistpubs/SpecialPublications/NIST.SP.1212.pdf

The Committee also changed the status of the item to "Information" because an NCWM TG, under the direction of the Committee, was now assisting in the development of the proposal. This change in status is an indication that the Committee has taken on responsibility for the additional development of this item.

See the Committee's 2016 Final Report for additional details and background information.

An update was given at the 2017 NCWM Interim Meeting on this developing item by Mr. Alan Walker (Florida), Chairman of NCWM's Weigh-In-Motion TG and Mr. John Lawn, (Rinstrum, Inc.). Mr. Walker reported that the TG is currently reviewing the different paragraphs in the Scales Code of HB 44 to determine needed amendments to

address WIM vehicle scale systems. That review started with the "Application" section of the code and has now progressed to the "Notes" section of the code. Mr. Walker noted that there are few weights and measures regulatory officials participating on the TG and encouraged anyone who might be interested in wanting to participate, to please contact him. Mr. Lawn provided an update on some recent testing of a Rinstrum WIM vehicle scale system by the State of Illinois and witnessed by some members of the TG. Mr. Lawn indicated that the results of this testing proved inclusive due to poor weather conditions on the day of the test.

Mr. Russ Vires (Mettler-Toledo, LLC), speaking on behalf of the SMA, reported that the SMA takes no position on this item at this time and looks forward to recommendations from the Weigh-In-Motion TG.

Mr. Rick Harshman (NIST OWM) complimented the TG on its progress, while noting too, that OWM believes a significant amount of work still remained to be done (particularly in the area of defining appropriate test procedures) before the proposal would be ready for consideration as a voting item.

The Committee agreed to maintain an Informational status on this item to allow the TG time to complete its work.

An update was given to the Committee at the 2017 NCWM Annual Meeting on this Information item and the status of the work performed by the NCWM's Weigh-In-Motion TG by Mr. Alan Walker (Florida), Chairman of the TG. Mr. Walker reported that the TG has made considerable progress this past year and has reached a point where it believes it would of value to submit the revised document and ask for feedback. Mr. Walker also mentioned that the TG will develop a 'white paper' identifying specific changes for which the TG is hoping to receive feedback. Mr. Walker asked the Committee to maintain the item's Information status.

Mr. Russ Vires (Mettler-Toledo, LLC), speaking on behalf of the SMA, stated that the SMA takes no position on this item at this time and looks forward to recommendations from the recently formed Weigh-In-Motion TG.

Mr. John Barton (NIST OWM) echoed the comments made by Mr. Walker and supported the idea that the output of the TG be accepted by the S&T Committee for intent of the TG receiving feedback from the Regional Weights and Measures Association Meetings.

Mr. John Lawn, (Rinstrum, Inc.) supported the comments made by Mr. Walker. Mr. Lawn further reported that the TG needed feedback to determine the best way to test WIM vehicle scale systems intended for commercial application. He said that he felt if the device was tested statically, the tolerance values should be based on acceptance and maintenance tolerances currently defined for a Class III L device. He then indicated that testing for dynamic operation is different from static operation and that dynamic testing should consist of three consecutive test runs with the vehicle loaded with test weights followed by three consecutive test runs with the vehicle unloaded. Mr. Lawn stated that WIMs tested dynamically should be required to comply with tolerances where acceptance and maintenance tolerances are the same and that the rationale for this is the fact that dynamic tests on systems such as CIM RR scales and dynamic monorail systems use the same values for acceptance and maintenance tolerance. He further stated that tolerance values should only be applied to the value of the test weights used in the vehicle during the first three test runs. Mr. Lawn explained that the procedure consisting of three consecutive runs of a loaded vehicle followed by three consecutive runs of the vehicle unloaded would produce satisfactory results and would better avoid the introduction of unknown errors that may be incorporated if the testing involved a reference scale that was not installed at the same location as the WIM under test.

The Committee agreed with TG chairman's recommendation to keep the item "Informational."

**Regional Association Comments:**
WWMA: The Committee agreed to recommend this item move forward as an informational item. The WIM Vehicle Scale Task Group has circulated a white paper during the open hearings requesting input from the membership of the region. The Committee encourages those wanting to provide input to contact Mr. Alan Walker (FL) Chairman of the Task Group, or Mr. Tim Chesser (AR) Co-Chairman of the Task Group. Several of those giving testimony at the open hearings stated that they would like the acceptance tolerance to equal ½ the maintenance tolerance for both static and dynamic testing. Another comment was heard suggesting the acceptance

tolerance be equal to ½ the maintenance tolerance for static testing and equal to the maintenance tolerance for dynamic testing.

SWMA: The Committee heard comments from members of the WIM Task Group, who noted that a lot of progress has been made, but additional input is still needed. Multiple weighing device manufacturers who are also members of the Task Group expressed concerns about modifications to the tolerances and urged caution in considering the impact such changes might have. There were also questions raised regarding how the tolerance structure was established for other dynamic systems, including in-motion monorail scales and railway track scales, and some noted that review of the history for how these tolerances were established is warranted. Some also commented that additional work is needed on the test procedures; until clear test procedures can be established and agreed upon, there is no evidence that the systems can meet the proposed tolerances under conditions of normal use. The Committee also heard comments indicating that more data is needed to make an informed decision regarding changes to the tolerances. The Chairman of the Task Group, Alan Walker, commented that prior to elevating this item to a Voting item, the Task Group needs additional input, particularly from weights and measures jurisdictions to assess what additional work is needed, and he noted this may include collecting test data demonstrating that systems can meet the tolerances.

The Committee recommends this item remain "Informational" until such time that additional information has been gathered and a recommendation made by the Task Group to the NCWM S&T Committee to change the status of the item.

CWMA: The committee heard support from Cardinal and Fairbanks for leaving acceptance tolerance one half of maintenance tolerance. Dick Suiter Consulting and Rinstrum supported acceptance tolerances equal to maintenance tolerances for dynamic testing to be uniform, with other dynamic weighing in HB 44. The committee believes this item has merit, however as (previously mentioned) devices need NTEP certification before being placed into commercial service. The CWMA recommended that this be a Developing item.

NEWMA: A comment was submitted electronically by Lou Straub (Fairbanks Scale) as a member of the WIM Task Group that there is disagreement within the task group on what kinds of tolerances should be met. Item submitter John Lawn (Rinstrum) asked for maintenance and acceptance tolerance be the same. Eric Golden (Cardinal Scale) believes that the acceptance tolerance should be half the maintenance tolerance. WIM task group is looking for additional comments to further develop the item. NEWMA recommended that this item move forward as Informational and to be developed by the WIM task group.

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

Return to Proposal

## ABW – AUTOMATIC BULK WEIGHING SYSTEMS

### ABW-3 D A. Application, S Specifications, N. Notes, UR. User Requirements

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

Doug Musick
Kansas Department of Agriculture
785-564-6681
dmusick@kda.ks.gov

**Background/Discussion:**
The submitter responsible for developing this item provided an updated proposal in October 2017 for consideration at the 2018 Interim Meeting. The previous version of the item under consideration was as follows:

**A. Application**

**A.1. General.** – This code applies to ~~**automatic bulk**~~ weighing systems, ~~**that is, weighing systems**~~ **capable of**~~**adapted to the automatic**~~ **automatically** weighing ~~**of a commodity in**~~ successive drafts of **a bulk commodity without human intervention.**~~**predetermined amounts automatically recording the no-load and loaded weight values and accumulating the net weight of each draft.**~~
(Amended 1987 **and 20XX**)

**S. Specifications**

**S.1. Design of Indicating and Recording Elements and Recorded Representations.**

**S.1.1. Zero Indication.** – ~~**Provisions**~~ **An Automatic Bulk Weighing System (ABWS)** shall ~~**be made to**~~indicate and record a no-load reference value and, if the no-load reference value is a zero value indication, to indicate and record an out-of-balance condition on both sides of zero.
**(Amended 20XX)**
.
.
.
**S.1.5. Recording Sequence.** – ~~**Provision**~~ **An ABWS** shall ~~**be made so that**~~ **indicate** all weight values ~~**are indicated**~~ until ~~**the completion of the**~~ recording of the indicated value **is completed**.
**(Amended 20XX)**

**S.1.6. Provision for Sealing Adjustable Components on Electronic Devices.** – Provision shall be made for applying a security seal in a manner that requires the security seal to be broken before an adjustment can be made to any component affecting the performance of the device.

**S.1.7. No Load Reference Values – An ABWS shall indicate and record weight values with no load in the load-receiving element. No load reference values must be recorded at a point in time after product flow from the load receiving element is stopped and before product flow into the load receiving element has started. Systems may be designed to stop operating if a no load reference value falls outside of user designated parameters. If this feature is designed into the system then the no load reference value indicated when the system is stopped must be recorded, an alarm must activate, weighing must be inhibited, and some type of human intervention must be required to restart the system after it is stopped.**
**(Added 20XX)**

**S.1.8. Loaded Weight Values – An ABWS shall indicate and record loaded weight values for each weighment.**
**(Added 20XX)**

**S.1.9. Net Weight Values – An ABWS shall calculate and record net weight for each weighment.**
**(Added 20XX)**

**S.1.10. Net Weight Accumulation – An ABWS shall automatically accumulate and record the sum of all net weight values for each weighing process.**
**(Added 20XX)**

**S.3. Interlocks and ~~Gate Control~~Product Flow Control.**

**S.3.1. ~~Gate Position~~Product Flow Control.** ~~Provision~~ **An ABWS** shall ~~be made to~~ clearly indicate to the operator **product flow status** ~~the position of the gates leading directly~~ to and from the ~~weigh hopper~~**load receiving element. Many types of equipment can be used to control the flow of product into and out of a load receiving element automatically including but not limited to gates, conveyors, augers, robots, pipes, tubes, elevators, buckets, etc.**
**(Amended 20XX)**

**S.3.2. Interlocks.** – Each automatic bulk weighing system shall have operating interlocks to provide for the following:

(a) Product cannot be cycled and weighed if the weight recording element is disconnected or subjected to a power loss.

(b) The recording element **can only** ~~cannot print~~ **record** a weight if ~~either of the gates~~ **equipment controlling product flow to or from the load-receiving element is in a condition that allows product to enter or leave the load receiving element.** ~~leading directly to or from the weigh hopper is open.~~

(c) A "low paper" sensor, when provided, is activated.

(d) The system will operate only in the proper sequence in all modes of operation.

(e) When an overfill alarm is activated, the system shall indicate and record an overfill condition.

(Amended 1993 **and 20XX**)

**S.3.3. Overfill ~~Sensor~~And Interference Detection.**

(a) **The system must have a means to detect when** ~~**T**~~**t**he ~~weigh hopper~~**load-receiving element** ~~shall be equipped with an~~**is** overfill**ed. When an overfill condition exists** ~~sensor which will cause the feed~~**product flow to the load receiving element must be stopped,** ~~gate to close,~~an alarm must activate,~~activate an alarm, and inhibit~~ weighing **must be inhibited** until the overfill condition has been corrected**, and some type of human intervention must be required to restart the system. An alarm could be many things including a flashing light, siren, horn, flashing computer screen, etc. The intent of an alarm is to make the operator aware there is a problem which needs corrected.**
(Added 1993) **(Amended 20XX)**

*(b)* ~~*If the system is equipped with a*~~***Downstream storage devices and other equipment, permanent or temporary,*** ~~*lower garner or surge bin, that garner shall also*~~ ***which have the potential to interfere with weighment when overfilled or not functioning properly must have a means to prevent interference. When interference exist the system must stop, an alarm must activate, product flow must stop, weighing must be inhibited until the interference has been corrected, and some type of human intervention is required to restart the system.*** ~~*be equipped with an overfill sensor which will cause the gate of the weigh hopper to remain open, activate an alarm, and inhibit weighing until the overfill condition has been corrected.*~~
*[Nonretroactive as of January 1, 1998]*
(Amended 1997 **and 20XX**)

**N. Notes**

**N.1. Testing Procedures**.

**N.1.1. Test Weights.** – The increasing load test shall be conducted using test weights equal to at least 10 % of the capacity of the system:

(a) on automatic ~~**grain**~~ bulk~~-~~weighing systems installed after January 1, 1984 **used to weigh grain**; and

(b) on other automatic bulk-weighing systems installed after January 1, 1986.
(Amended 1987**, and 20XX)**

**UR. User Requirements**

**UR.4. System Modification.** – **Components of** ~~**T**~~**t**he weighing system, shall not be modified except when the modification has been approved by a competent engineering authority, preferably that of the engineering department of the manufacturer of the scale, and the official with statutory authority having jurisdiction over the scale.
(Amended 1991 **and 20XX**)

The submitter provided the following points of discussion:

- There are many systems in use that don't meet the definition for a "scale" or an "Automatic Bulk Weighing System" or anything else in the Handbook. These changes will make it easier for regulators/inspectors to determine if a system should be evaluated as an "ABWS".
- The wording "automatic bulk weighing systems" should not be used in the definition of the same.
- The no load and loaded weight recordings are important, but they are specifications and should not be included in the application code.
- The current code does not clearly define at what level of automation a system would be considered an ABWS versus a scale with some accessory equipment (hopper, tank, etc.). This is an attempt to more clearly distinguish which systems should be considered ABWS's.
- Human intervention could be many things. Some examples include but are not limited to pushing a reset button, turning power off then back on, typing a password, or entering a statement into a system log. The intent with including the term "human intervention" is to not include all systems which have a high degree of automation, only the ones that cycle repeatedly and can potentially operate without anyone present to observe weighing malfunctions.
- There are many types of load receiving elements that will work with an ABWS to include but not limited to tanks and hoppers so the previous language referring to hoppers was removed and replaced with the generic but accurate term "load receiving element".
- The old language implied separate sensors (e.g. bindicators) were required. Newer systems have already bypassed the use of separate sensors and utilize the weight indications to identify an overfilled condition, similar to how the indications are used to regulate product flow into the load receiving element for some devices. Concerns for this approach have been raised for situations when an indicator is not functioning properly. That is a legitimate concern, but my reply then is: What is the backup for an indicator not indicating properly on any other type of device? This is something we know happens with other devices and commonly may not be detected until a device inspection and test is completed. Thus, one reason routine inspections and testing are required.
- Many types of equipment can be used to control the flow of product into and out of a load receiving element automatically including but not limited to gates, conveyors, augers, robots, pipes, tubes, elevators, and buckets. Examples would be a conveyer delivering product – in such a case the recording element should not record if the conveyer is still moving or in the case of a pneumatic transfer tube the recording element should not record if the blower forcing air through the tube is still operating. Therefore, the old language referring to gates was removed and replace with more generic terminology which can be applied to any equipment used to control product flow not just gates.

- Many types of equipment can be used for downstream commodity storage including but not limited to hoppers, tanks, bins, flat storage, trucks, totes, rail cars and pits. The language referring to "lower garner", "surge bin", etc. has been removed and replaced with a more terms such as "downstream storage devices" to allow for all potentials types of product handling equipment.
- A downstream storage device itself may not interfere with the weighing process directly, but it also cannot create a situation in which an overfill condition or some other malfunction of the equipment interferes with the weighing process. An example would be a grain storage hopper located under a weigh hopper in a position which when grain is mounded up above the storage hopper the grain touches the bottom of the weigh hopper and interferes with the weighing process. For this example, if the storage hopper can be lowered far enough below the weigh hopper so that the mounded grain when it reaches its' maximum potential height cannot touch the weigh hopper then it would not need the capability to detect an overfill condition. The same scenario would apply to a truck parked under the load receiving element, or a conveyer under the load receiving element. Wording was added to ensure interference does not occur and if it does that the system activates controls to prevent weighment errors.

The original code was written for very specific equipment for a very specialized use. This is a fairly drastic change from the original and introduces some new terminology that may present some confusion or uncertainty to those who were fairly familiar with the existing code. Some individuals feel the proposed changes may add some uncertainty as to what systems should or shouldn't be considered an ABWS.

The Committee received an update on this item at the 2016 Interim Meeting from its submitter, Mr. Doug Musick (KS). Mr. Musick indicated that the current proposal is an initial attempt to update the current ABWS Code to address some newer automated weighing systems known to exist in the marketplace. Some of these newer systems aren't able to comply with the existing ABWS Code, which provides indication of the need to update the current code.

OWM commented that it recognized the need for HB 44 to include requirements that address some ***automated*** weighing systems currently in the marketplace that, for one reason or another, fail to meet the definition of an ABWS or the application of the ABWS Code. As is the case with an ABWS, these systems are also used to weigh bulk commodities in an automatic operation. A number of these weighing systems do ***not*** consistently return to zero following discharge of a draft load due to:

- the density of the commodity being weighed and its susceptibility to cling;
- structural deformations in the load-receiving element (which trap and prevent product from being completely discharged);
- venting issues;
- system vibration; etc.

OWM gave the example of *some* seed treatment systems, known to exist in the commercial marketplace, that will automatically fill to a load value targeted by the system operator by weighing multiple drafts *automatically* and *without* operator intervention. When these systems are operational, not all the weighed product necessarily gets discharged with the draft load. The remaining product is typically referred to as a "heel." Some of these systems only record the gross weight of the different drafts weighed; yet, the "heel" remaining for each draft load cycled through the system needs to be taken into account for an accurate determination of the net quantity to be made.

OWM noted the single-most important factor in determining whether or not an automated weighing system needs to take into account the no-load reference and gross-load reference to determine an accurate net weight for individual drafts weighed is the system's ability to consistently return to zero following discharge of the load. This determination must be made on a case-by-case basis and will vary depending on the design of the system and the products being weighed.

The Committee agreed that more work was needed to develop the item and assigned it a "Developing" status. The Committee recommended that the item's submitter review the 2015 SWMA S&T Annual Report for additional proposed revisions to the proposal by that region's S&T Committee.

The Committee received an update on this item at the 2016 Annual Meeting from Mr. Doug Musick (KS). Mr. Musick reported that work on the proposal is ongoing and he soon planned to submit an updated version of proposal to the Committee. He reiterated a comment made at the 2016 Interim Meeting that the proposal is an attempt to update the current ABWS Code to address some newer automated weighing systems known to exist in the marketplace today that aren't able to comply with the existing ABWS Code.

OWM reported that it looked forward to being able to review an updated proposal to "modernize" the ABWS Code to more fully reflect the different types of systems currently in the marketplace.

The Committee agreed to recommend this item move forward as Developing to allow for additional time to fully develop the proposal.

See the Committee's 2016 Final Report for additional details and background information.

At the 2017 NCWM Interim Meeting open hearings, the Committee took comments on Agenda Item 3202-1.

The Item's submitter, Mr. Doug Musick (KS), submitted an amended version of the proposal following the 2016 NCWM Annual Meeting and commented that he felt the proposal was now fully developed and asked the Committee to move this item to a vote.

Mr. Rick Harshman (NIST OWM) recommended that the item remain Developing. He questioned whether the proposed changes belonged in the ABWS code or possibly in an entirely separate code intended to address some automatic weighing systems known to exist in the marketplace for which the Scales Code, nor the ABWS Code, seem to fit their design and operational characteristics. He noted that the existing ABWS Code is intended to apply to systems that weigh only one commodity at a time in successive drafts. He asked, "if the proposed changes are intended to expand the existing code to include a wider range of systems, which additional systems is the submitter intending to address by expanding the ABWS Code?" Mr. Musick answered that it addresses weighing systems capable of operating without human intervention.

Mr. Russ Vires (Mettler-Toledo, LLC), speaking on behalf of the SMA, reported that the SMA takes no position on this item at this time and looks forward to more data.

Mr. Richard Suiter (Richard Suiter Consulting) urged the Committee to exercise caution in considering this item. He stated that he had concerns about striking the language for overfill sensors, and described how the sensors are not just for over capacity of the container. He noted that they are also for sensing when the height of the product reaches a point higher than the edge of the container, even though the container may not be at capacity. He advised that this redefining be done with careful consideration.

In consideration of the comments received, the Committee agreed that this item remain as Developing, to allow time to determine the impact of the changes on systems in this code.

At the 2017 NCWM Annual meeting, S & T Committee Chair Dr. Matthew Curran (FL) stated the Committee will only hear comments/updates from the submitter on developing items during open hearings. The Committee received an update on the item from Mr. Doug Musick (KS). Mr. Musick reported that work on the item is ongoing and he expects to have the proposal completed and ready for review at the 2018 NCWM Interim Meeting. Based on the update provided and in consideration of the ongoing work on this item, the Committee agreed to carryover the item on its agenda as a Developing item.

**Regional Association Comments:**
WWMA: The Committee agreed to recommend this item remain a developing item and understands the submitter is still working on the item. The Committee would welcome input from other individuals on this item as there was only one comment during the open hearings.

SWMA: The Committee heard comments jointly on the following items in a "batch": 3200-1 S.1.2. Value of Scale Division Units & Appendix D (Scales); 3202-1 A. Application, S. Specifications, N. Notes, UR. User Requirements (ABWS); and New 28 A. Application and Appendix D. Definitions – batching systems.

The Committee heard comments from Russ Vires, on behalf of SMA, noting that the SMA took no position on this item. The Committee heard no other comments on the item. The Committee considered recommending this item be maintained as a "Developing" item; however, after further discussion, the Committee noted that the item has been on the agenda for multiple years with little change. Consequently, the Committee recommends the item be withdrawn and, should the submitter want to resubmit the item, could do so in the future.

CWMA: The committee heard testimony from Kansas stating the item is fully developed and ready for vote. The committee agrees with the submitter and recommends this be a Voting item.

NEWMA: No comments were heard on this item. The committee believes this item has merit but should remain in the hands of the source as a Developing item.

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

Return to Proposal

## ABW-4 A. Application and Appendix D: Definitions – batching system

**Background/Discussion:**
Item 3200-1 on the 2017 Agenda of the NCWM S&T Committee was returned to Committee at the 2016 Annual Conference. The item failed to receive sufficient votes to either pass or be defeated. The Item was opposed by the SMA. The SMA feels the definitions is for the application of a scale and not a performance application. OWM while opposed to the addition of a definition for batching scales acknowledged the existence of some automated weighing systems that, by virtue of their design and/or operational characteristics, fail to meet the HB 44 definition of an ABWS and, therefore, might present a challenge to those needing to determine which HB 44 requirements to apply. The proposed definition for batching system is based on the definition found in SMA book of "Terms and Definitions" published in their1981 Fourth Edition.

There are many batching scales and batching systems already in the market place, some of which have an NTEP Certificate of Conformance. The proposed exception to the Automatic Bulk Weighing Systems Code and accompanying definition will assist weights and measures official in identifying some devices as belonging in scales code for evaluation and testing purposes. A search of the keyword batching in the NTEP certificate data base provides eight pages of certificates (approximately 10 per page) that include the term batching on the certificate.

Some individuals believe that all automated systems utilizing a hopper scale belong in the Automatic Bulk Weighing Systems Code (ABWS). I believe that NTEP and the Market Place have already demonstrated that there are devices and systems that do not need to meet some of the stringent requirements of the ABWS Code. These devices and systems are capable of providing accurate net weight without the necessity of some of the additional requirements of the ABWS Code. Those requirements add unnecessary additional manufacturing costs and testing burdens for weights and measures field officials.

**Regional Association Comments:**
WWMA: The Committee recommends this item to be continued as an informational item because the committee feels it has merit, however, it failed to make the printed agenda even though it was submitted on time. There was a lack of testimony in the open hearings due to the item not being a part of the printed agenda. This item is a replacement of voting item 3200-1.

**SWMA:** The Committee heard comments jointly on the following items in a "batch": 3200-1 S.1.2. Value of Scale Division Units & Appendix D (Scales); 3202-1 A. Application, S. Specifications, N. Notes, UR. User Requirements (ABWS); and New 28 A. Application and Appendix D. Definitions – batching systems.

The Committee heard comments from the submitter of the item, Richard Suiter. Mr. Suiter provided an overview of the item, including how the issue originated. He also displayed a picture of a sample system illustrating how one of the more modern "batching systems" are laid out. The Committee also heard comments from Tina Butcher (NIST OWM) questioning whether a separate code addressing dynamic weighing systems might be warranted, noting that the ABWS Code didn't originally envision these new systems, but the current Scales Code may not include the necessary safeguards to automatically ensure a zero start. Mr. Suiter noted that he had recommended the addition of a specification in an earlier proposal, but that was not accepted by the NCWM. He noted that there is an urgency to include something to address these systems as opposed to waiting for the development of a separate code. The Committee recommends the item be designated as a Voting item.

CWMA: This definition replaces 3200-1, which was withdrawn by the submitter. The committee believes this definition is more appropriate and the item is fully developed and ready for voting.

NEWMA: No comments were heard by the committee. The committee believes this item is fully developed and recommended that it be a Voting item.

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

Return to Proposal

## LMD – LIQUID MEASURING DEVICES

### LMD-2 D S.1.6.7. Recorded Representation, S.1.6.8. Recorded Representations for Transactions Where a Post-Delivery Discount(s) is Provided. and UR.3.4. Printed Ticket

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

Nick Owens
Stark County Ohio
(330) 451-2377
njowens@starkcountyohio.gov

or

Tom Konst
Carroll County, OH
(330) 627-2096
tfkonst@hotmail.com

**Background/Discussion:**
This item was first proposed in 2017 and given informational status by the S&T Committee. The submitters, assigned to develop the item, have made modifications to the original proposal, adding changes to paragraphs S.1.6.7. Recorded Representations and S.1.6.8. Recorded Representations for Transactions Where a Post-Delivery Discount(s) is Provided.
The previous Item under Consideration was as follows:

> UR.3.4. Printed Ticket. – **This requirement applies only to devices that are capable of issuing a printed ticket.** The total price, the total volume of the delivery, **a corresponding alpha or numeric dispenser designation** and the price per liter or gallon shall be shown, either printed by the device or in clear hand script, on any printed ticket issued by a device and containing any one of these values.
> (Amended 2001 **and 20XX)**

The consumer and weights and measures official would be able to verify that all transaction information corresponds accurately at locations with multiple dispensers on site. If no pump designation is on the receipt, it hinders the consumer's ability to know that they were given the correct receipt for the transaction. Similarly, a pump designation on the receipt will asset weights and measures in verifying correct communication between devices as well as follow as needed in case of a consumer complaint.

Adding this language will bring this section in line with S.1.6.7. and S.1.6.8.

The submitter recognizes that software updates would be required for those establishments that do not already meet this proposed amendment. In discussion with Gordon Johnson, Gilbarco Inc., he indicated that industry would be able to accomplish the software updates in 2 -3 years if the amendment was passed.

During the 2017 NCWM Interim Meeting S&T Committee's open hearings, Mrs. Tina Butcher (NIST OWM) noted that paragraph UR.3.4. Printed Ticket was originally added to NBS Handbook 44 in 1967 at the request of industry to address technology limitations which would have made it impractical from a cost perspective to print all three values (i.e., total price, total volume of delivery, and the price per liter or gallon). She said one question that might be considered given today's technology is whether the provision to allow values to be written in hand script is still appropriate or if a system that is capable of providing a printed ticket should be required to print all of the values. She noted too that this item didn't propose corresponding amendments to paragraphs S.1.6.7. or S.1.6.8. To this point, she indicated that the Committee may want to consider recommending changes to those two requirements to align the requirements for printed receipts. As a final comment, she said that should the Committee decide to recommend paragraph UR.3.4. be changed, it may want to reorganize the paragraph so it is clearer and intended only to apply to devices that issue a printed ticket. She provided the Committee a revised version of the paragraph, which had been developed by members of OWM's Legal Metrology Devices Program for the Committee to consider.

Mr. Dmitri Karimov (Liquid Controls), speaking on behalf of the MMA reported that the MMA supported the NIST observations.

In discussing this item during the Committee's work session, members of the Committee agreed that the manner in which paragraph UR.3.4. is currently structured needs improvement. Some members of the Committee described the paragraph as being "messy" and difficult to follow. The Committee reviewed the revised version of the paragraph developed by members of OWM's LMDP and it was agreed that, although still not ideal, it was an improvement over the version that was included under this item. Consequently, members of the Committee agreed to replace the submitter's version of the proposal with the revised version offered by NIST and shown in Item under Consideration and present this item for vote at the upcoming NCWM Annual Meeting.

At the Committee's 2017 NCWM Annual Meeting open hearings, Mrs. Tina Butcher (NIST OWM) reiterated comments provided by OWM during the 2017 Interim meeting. She said OWM understands the benefit of identifying the alpha or numeric designation of the dispenser on printed receipts, but questions given today's technology why a provision for providing the customer the required information in hand script is needed. She suggested that specification paragraphs S.1.6.7. and S.1.6.8 (which include requirements for printed receipts) should also include provisions for the dispenser designation, providing this information is deemed beneficial to inspectors and consumers. The proposed paragraph UR.3.4. would require users to hand print this information on receipts even on devices which comply with the current S.1.6.7. and S.1.6.8. The printer should be capable of printing all the values.

Mr. Dimitri Karimov (Liquid Controls), speaking on behalf of the MMA, recommended that the item status be changed to "Information" so that the specification and existing user requirement paragraphs can be revised.

Additional consideration needs to be given in the drafting of the changes proposed to paragraph UR.3.4. to wholesale versus retail applications.

Based on comments received during the open hearings the Committee felt the submitter should consider modifying specification paragraphs S.1.6.7. and S.1.6.8. of the LMD code and the existing user requirement. Based on these needed amendments, the Committee decided to change the status of the item from Voting (V) to Developing (D).

**Regional Association Comments:**

WWMA: This item was originally presented by the committee in the voting session as a voting item on the voting consent calendar. Ron Hasemeyer with Alameda County, CA asked for it to be removed from the consent calendar during discussion in the voting session. It was removed and voted upon individually, and the vote failed. The Committee briefly met during a recess in the voting session and agreed that this item should move forward as a Developing item. This was presented when the voting session resumed and the recommendation passed.

SWMA: The Committee heard no comments on this item. The Committee acknowledged that the submitter has modified the proposal from the original (which only proposed changes to the user requirement UR.3.4.) to include proposed changes to two specifications paragraphs, S.1.6.7. and S.1.6.8. During its work session, the Committee acknowledged that there was general support during the Measuring Sector's recent meeting for including identifying information for the pump on printed tickets/receipts, but there should be accompanying requirements in the "Specifications" section of the code. Given that the item has been updated (to include proposed specifications) based on comments received during the NCWM meetings and that there were no comments during the SWMA meeting, the Committee recommends this item as a Voting item.

CWMA: The committee heard comment from the submitter and believes the item is ready for voting.

NEWMA: No comments were heard on this item. The committee believes this item has been fully developed, has merit and is ready for a vote.

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

Return to Proposal

# LPG – LPG AND ANHYDROUS AMMONIA LIQUID-MEASURING DEVICES

## LPG-3 S.2.5. Zero-Set-Back Interlock, Stationary and Vehicle Mounted Meters, Electronic

**Background and Discussion:**
This specification has been in place for VTMs for many years. Its purpose is to prevent a second party from being charged for product delivered to the first party. However, there is no requirement for interlocks in the LPG code, other than the requirement added in 2016 for stationary retail motor fuel devices. Currently, the only protection is provided by two User Requirements paragraphs, UR.2.5. Ticket in Printing Device, which prohibits the "riding of tickets" (having a ticket in the printer while the vehicle is moving from one location to another) and UR.2.1. Return of Indication and Recording Element to Zero, which requires the indications to be set to zero before a delivery. Both of these requirements are extremely difficult, if not impossible to enforce where printers are frequently mounted in the cab of the vehicle and are not visible to an observer outside the vehicle.

In addition, electronic registers used in stationary applications shall not be exempt from this requirement due to the possibility of a second party being charged for product delivered to the first party in this scenario as well.

This requirement for electronic indicators already exists in the VTM code, and being as the majority of electronic registers are used in both applications, I cannot see any objections as to why this requirement should be added to the LPG and Anhydrous Ammonia Liquid-Measuring Device code.

**Regional Association Comments:**
WWMA: The Committee agreed to recommend this item be carried forward as a Developing item, with the desire to hear input from the other regions in addition to hearing from industry including the meter manufacturers association.

SWMA: The Committee heard comments from the submitter, Ken Ramsburg, MD, who noted that the purpose of the proposal is to align the LPG & NH3 code with requirements already included in the Vehicle-Tank Meters Code. The Committee heard no comments in opposition to the proposal and recommends the item for a vote.

CWMA: The committee heard no comments opposing this item, and since the language is already in HB 44, the committee recommends the item be moved to voting. The committee appreciates the work of the Office of Weights & Measures on clarifying these items.

NEWMA: There was some clarification provided on the purpose of this item and the committee believes it has been fully developed. This item is recommended as a Voting item.

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

Return to Proposal

## LPG-4 D N.3. Test Drafts.

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

Michael Keilty
Ph: 970-586-2122
Mobile: 317-701-0823
michael.keilty@us.endress.com

**Background / Discussion:**
The use of transfer standards is recognized in Code sections 3.34 Cryogenic Liquid-Measuring Devices Code and 3.38 Carbon Dioxide Liquid-Measuring Devices Code and 3.39 Hydrogen Gas-Measuring Devices – Tentative Code. Transfer standard is only defined for testing cryogenic liquid measuring devices. It has been pointed out that the term transfer standard is not correct and that field reference standard meters may be more appropriate. See new the item under consideration, updated on September 8, 2017.

Field evaluation of LPG meters and CNG dispensers and LNG dispensers is very difficult using volumetric and gravimetric field standards and methods. The tolerances for these applications are such that using field reference standard meters are more efficient and safer. With CNG and LNG and LPG applications, the field reference standard meters are placed in-line with the delivery system as it is used to fill tanks and vehicles. The use of field reference standard meters eliminates return to storage issues. The use of field reference standard meters is easier and faster compared to the use of traditional field standards. The cost of using field reference standard meters and transporting them is much less than the cost of traditional field provers and standards.

Recognition in Handbook 44 will enable States to allow field reference standard meters to place systems into service and for field enforcement.

Volumetric field provers and gravimetric field proving are susceptible to environmental influences. The State of Colorado uses a field reference standard meter to test propane delivery truck meters. The State of Nebraska has used a field reference standard meter to test agricultural chemical meters. Other States have asked that there be recognition in HB44 in order for their State to allow the use of field reference standard meters.

In some applications, field reference standard meters are not more accurate than the meters used in the application. For that reason, longer test drafts and possibly more tests may need to be run.
The State of California is purported to have conducted a short study of field reference standard meters in the past. The conclusion did not lead to wide adoption of the practice.

Section 3.37 Mass Flow Meters user requirement U.R.3.8. Return of Product to Storage, Retail Compressed Natural Gas Dispensers requires that the natural gas which is delivered into the test container must be returned to storage. This is difficult and most often not complied with when the test vessel contents are released to atmosphere. States often have difficulties in remote locations finding suitable field reference equipment.

The Committee initially considered a proposal to modify paragraph N.3. Test Drafts and to add a new paragraph N.3.2. Transfer Standard Test as shown below. Note that, in Fall 2016, Mr. Keilty provided an update to this proposal as shown in the Item Under Consideration above.

**N.3. Test Drafts. –**

**N.3.1 Minimum Test -** Test drafts should be equal to at least the amount delivered by the device in one minute at its normal discharge rate.
(Amended 1982)

**N.3.2. Transfer Standard Test. – When comparing a meter with a calibrated transfer standard, the test draft shall be equal to at least the amount delivered by the device in 2 minutes at its maximum discharge rate.**

The submitter recommended that NIST update EPO 28 for CNG dispensers and EPO 26 for LPG Liquid Measuring Systems to include transfer standard meter tests. NIST Handbook 105-4 should also be revised to specifically address the transfer standard meter and the requirements for use.

The S&T Committee might also consider amending Sections 3.30 Liquid-Measuring Devices Code and 3.31 Vehicle-Tank Meters Code to allow transfer standard meters.

**2015 Interim and Annual Meetings:**
The Committee heard comments both in support of and in opposition to the proposal outlined in this item and a corresponding item in the Mass Flow Meters Code. Mr. Mike Keilty (Endress + Hauser Flowtec AG USA), submitter of these two items, outlined the benefits of using a master meter as a standard in testing application such as CNG, LNG, and LPG. The Committee heard comments in opposition to the proposal from Mr. Henry Oppermann (Weights and Measures Consulting, LLC), speaking on behalf of himself, as well as Seraphin Test Measure, Co. Mr. Oppermann noted there are significant differences between a transfer standard and a field standard. Mrs. Tina Butcher (NIST OWM) acknowledged the advantages to identifying and developing alternate test methods such as this, but noted that simply adding the proposed language doesn't address the multiple other elements that need to be in place to ensure traceability; OWM provided a list of those elements along with other suggestions. OWM noted that the USNWG on Alternative Test Methods might be a better venue to develop the elements to support the use of these devices. This was echoed by Mr. Dmitri Karimov (Liquid Control, LLC) who also commented that the regulatory authority must assess the suitability of a given standard. The Committee also heard from Ms. Kristin Macey (CA) who commented that if the proposal were adopted, it would allow use of a transfer standard and California would not be able to fully support it, citing results of comparison testing conducted by CA in which the master meter performed worst of the three methods examined. Mr. Keilty, in response to Mrs. Butcher's and Mr. Oppermann's comments, stated that he agreed completely and noted that adding the paragraph to

these two codes is a step towards allowing the use of transfer standards and it's understood that there are many things that would need to be in place in order that they be considered suitable for use in testing. The Committee also heard other comments from regulators and industry supporting the continued development of this issue. The Committee agreed that the item has merit, but needs further development and suggested the submitter work with OWM by providing data for the USNWG to consider.

See the Committee's 2015 Final Report for details.

**2016 NCWM Interim and Annual Meetings:**
The Committee again heard comments both in support of and in opposition to this item and the corresponding item in the Mass Flow Meters Code. Mr. Michael Keilty (Endress + Hauser Flowtec), the submitter, stated that he supported this item as a voting item as did Alan Walker (FL). Others expressed support of the item, but noted the need for additional development. The Committee heard again from Mrs. Tina Butcher and Mr. Henry Oppermann, who reiterated their 2015 detailed comments regarding the tasks that need to be completed before considering changes to Handbook 44. Both echoed the need to collect data in order to properly evaluate whether or not a master meter could be considered a suitable standard.

During its Interim Meeting work session, the Committee acknowledged comments suggesting the need for additional test data. It was also acknowledged that there was a lot of support for the proposal. Those supporting the proposal had indicated that using a transfer standard is much easier and faster than testing gravimetrically and eliminates the need to discharge product from a prover into the atmosphere, which is viewed by many as a safety concern. Given that the addition of the proposed language would not dictate the method of testing and the decision on whether or not to use a particular method of testing would remain with each jurisdiction, the Committee agreed to present both items for vote at the Annual Meeting.

At the 2016 Annual Meeting, the Committee received numerous comments from industry and regulators alike, predominantly in support of the proposals. These comments cited benefits such as safety; faster and more efficient testing; and lack of problems with using master meters. Mr. Marc Buttler (Emerson Process Management – Micro Motion) also expressed supports of the items, but suggested replacing the words "maximum discharge rate" with "maximum test rate" in proposed paragraph N.3.2.; the submitter agreed with the suggestion.

The Committee also heard comments in opposition to the item and comments emphasizing the need for further development and data. A new comment offered by Mrs. Tina Butcher (NIST OWM) noted that the proposed new paragraph N.3.1. would create a conflict with the minimum test procedures outlined in the NIST EPO for CNG dispensers since tests conducted at the MMQ and at some other quantities are frequently completed in less than one minute. There was also some debate regarding the application of the Fundamental Considerations with regard to the allocation of error and uncertainty associated with a given test method and Mr. Henry Oppermann clarified the proper application of these criteria. Mr. Oppermann noted that transfer standards, in some cases, are no more accurate than the meter being tested and that the proposals lack a specification associated with the performance of the standard. He recommended the items be downgraded to Informational or Developmental.

During the Committee's work session, members of the Committee agreed that the comments received during the open hearings were mostly in support of the two proposals. The Committee discussed the proposed changes to the text, including the errors in the transcription of the text in the Item Under Consideration. The Committee discussed the potential impact on testing CNG dispensers, acknowledging that the proposed requirement cannot be met by someone wanting to apply the procedures in the NIST EPO (which were developed through a work group comprised of industry and regulatory officials). Some Committee members familiar with CNG testing concurred that a test run typically takes less than one minute to complete. The Committee was concerned with the potential conflict and questioned whether the submitter had fully considered the impact of the proposed language. These discussions led the Committee to decide to change the status of the item from Voting to Developmental and return them to the submitter for further development.

See the Committee's 2016 Final Report for details.

**2017 NCWM Interim Meeting:**
*Just prior to the 2017 NCWM Interim Meeting, the Committee agreed to amend the proposal in Agenda Item 3302-1 to that shown in Item under Consideration at the request of Mr. Michael Keilty (Endress & Hauser Flowtec AG USA), submitter of the item. The Committee chairman, Dr. Matthew Curran (FL) announced during open hearings of the Committee at the 2017 NCWM Interim Meeting that the proposal had been changed and that the revised version had been posted on NCWM's website.*

During the 2017 NCWM Interim Meeting, the Committee grouped Agenda Item 3302-1 and 3307-2 together and took comments on these items simultaneously because it considered these items related.

Mr. Michael Keilty (Endress & Hauser Flowtec AG USA), submitter of the item, commented that this was a voting item at the 2016 NCWM Annual Meeting during, where it was downgraded to a Developing status. He further offered the opinion that there was not a good mechanism for relaying back to the submitter what an item needs in the way of development. Having now submitted the item with amended language, he said that he would like to see this item put to a vote.

Mrs. Tina Butcher (NIST OWM) spoke of the need for standards used in testing to comply with the tolerances for standards specified in HB 44 Appendix A - Fundamental Considerations which, she noted, requires the combined error and uncertainty of any standard used without correction to be less than one-third the applicable device tolerance. She also made evident the potential for more than one type of standard to be used in testing, noting that the tolerances specified the Carbon Dioxide Liquid-Measuring Devices Code of HB 44 increase for different test methods. She stated that the proposal seemed to address only one particular type of transfer standard, i.e., a master meter, and, as a result, the proposal could have a very limiting effect on the types of transfer standards that can be used. She also questioned the use of the term "transfer standard" and suggested that the term, "field standard" may be a more appropriate term. As a final comment, she reiterated a previous OWM comment that more data is needed of comparisons to known standards.

Mr. Bruce Swiecicki (National Propane Gas Association) reported that the National Propane Gas Association supported the item and noted its potential for efficiencies and safety benefits.

Mr. Constantine Cotsoradis (Flint Hills Resources) asked that this item be moved forward, citing the need for it due to there being systems that are already in use for this purpose.

Mr. Hal Prince (FL) asked that the item be moved forward.

Mr. Ross Anderson (NY- retired) gave an example of alternative test methods being used for like applications, such as what the ASTM does. He stated that different test methods will have different results and that variables of those methods need to be evaluated. He commented that we are currently evaluating only one variable.

In consideration of the comments heard on these two items, the Committee agreed to present them for vote at the 2017 NCWM Annual Meeting.

**2017 NCWM Annual Meeting:**
At the 2017 Annual Meeting, the Committee grouped this item with Agenda Item 3307-2 and took comments on the two items at the same time. Several industry and regulatory officials voiced support to presenting the two items for vote. Some of those speaking in support of the items acknowledged that a lot of additional work still needed to be completed to confirm the adequacy of alternative test measures, such as a master meter, for use as a standard in testing commercial devices. The Committee was urged by some, however, to present the items for vote, noting that some states are already using alternative standards for testing and that the additional work needed to confirm their adequacy can be completed post adoption of the proposals.

There were also several who spoke in favor of maintaining the Developing status of the items. Mr. Steve Harrington (OR), for example, reported that the State of Oregon is pursuing the use of a mass flow meter standard for use in

testing LPG meters. He noted that additional work is needed to develop procedures that will confirm the adequacy of the mass flow meter (standard) for use in testing LPG meters used in commercial applications. He recommended maintaining the Developing status of the items.

Mrs. Tina Butcher (NIST OWM) reported that OWM believes the proposed changes are premature. More work is needed and OWM recommends maintaining the items as Developing. Mrs. Butcher provided an update on some ongoing work relating to alternative test methods and the current proposals under consideration as follows:

- The NTEP Measuring Sector is developing guidelines for type-evaluation laboratories when conducting type evaluation using alternative types of standards.

- NIST OWM has established a USNWG to examine alternative test methods.
    - The USNWG subgroup has been working to establish uncertainties for select test methods and examining data from some field tests.
    - The Group has developed guidelines for collecting measurement data.
    - The guidelines can be used by equipment manufacturers and/or W&M jurisdictions to collect data to examine different test methods and types of test standards.
    - Guidelines include tasks such as:
        - Developing a test protocol for collecting data and for identifying testing factors that may contribute the largest uncertainties in testing;
        - Following guidelines for data collection;
        - Collecting sufficient data under a similar variety of user conditions;
        - Identifying the major factors that could affect test results and contribute the largest uncertainties in testing;
        - Ensuring that Handbook 44 and EPOs are updated and available for its use;
        - Making all results and assessments accessible to States and other enforcement agencies; and
        - Publish an updated NIST 105 Series and calibration procedures, if not available.

- OWM is in the process of developing a proposal to address the use of the term "transfer standard" throughout HB44. According to NIST HB 130, the International Vocabulary of Metrology, and references in HB 44 Fundamental considerations, the reference in the current proposals should be "field standard." OWM plans to submit the proposal for consideration during the 2018 NCWM cycle.

Mrs. Butcher also noted that OWM has a significant concern with the proposal in Agenda Item 3307-2 because proposed new paragraph N.3.1. conflicts with the minimum test of a CNG RMFD being performed today in accordance with the NIST EPO. A test conducted at the MMQ typically takes far less than a minute to complete. Additionally, the test drafts performed at one-third, two-thirds, and three-thirds test tank capacity often are completed in less than a minute's time.

Mrs. Butcher also reiterated many of the points OWM had provided in previous NCWM Meetings relating to these two proposals. The following is a short summary of these points:

- The development of alternative methods of testing commercial metering systems is an important issue. Many applications, in which using currently recognized test methods, may be not be feasible because of product characteristics, safety, cost, access to equipment, and other factors.

- Modifying HB 44 as proposed doesn't ensure approval of any proposed test method. The decision on whether or not to accept a particular test method rests with the regulatory authority.

- Many things must be considered when selecting and determining the suitability of field standards to provide traceable measurements. These are sometimes referred to as the "essential elements of traceability." The following are some examples:
    - accuracy of a particular test standard relative to the applicable tolerance;
    - demonstrated reliability of the device over time;

  - device repeatability;
  - how well it duplicates actual use;
  - existence of documentary standards for the test equipment;
  - availability of equipment/facilities within a state lab to test the equipment; and
  - whether training has been provided for the lab staff, field officials, and users of the equipment.

- NIST HB 44 Fundamental Considerations, Section 3.2. Tolerances for Standards, specify that when a standard is used without correction, its combined error and uncertainty must be less than one-third of the applicable tolerance.

- The current proposal seems to simply borrow from other codes without technical rationale. There is a potential for more than one type of alternative test method. The current proposal may unintentionally limit other types.

- Even within the category of "master meters," different requirements may be needed for different master meter technologies in order to comply with this requirement.

- Should consideration be given to providing a larger tolerance when conducting tests using a particular test method as is done in the carbon dioxide and hydrogen codes? Testing would need to be conducted to demonstrate the magnitude of the additional tolerance.

- W&M needs a system that results in:
  - manufacturers knowing the requirements for the design of the standard;
  - systematic and appropriate collection of measurement data on proposed standards; and
  - states (regulatory authority) having access to the measurement data;
  - side-by-side testing to compare results with existing test methods.

- Additional data and analysis is needed prior to recommending specific language for adoption in HB 44.

Mr. Henry Oppermann, (Weights and Measures Consulting, LLC) speaking on his own behalf, as well as consultant for Seraphin Test Measure, Co. stated there is no clear understanding of the terms "field standard" and "transfer standard." Any standard proposed for use in testing must meet the tolerances for standards specified in the Fundamental Considerations (Appendix A) of HB 44 and there must be proof that the standard is able to comply with the tolerance over a range of field conditions. He raised the question, "without data to support the accuracy of a standard, how do you know it is accurate enough to use in testing a commercial device?" Mr. Oppermann expressed the need for the development of a test method (or procedures) that can be used to identify meters that perform well enough that they can be used as a standard in testing. Mr. Robert Murnane (Seraphin Test Measure, Co.) stated that he echoed Mr. Oppermann's comments. He acknowledged the existence of the national work group that NIST had created for the purpose of identifying the variables and parameters over which a proposed alternate standard must be tested and evaluated to ensure that the methodologies and standards facilitate measurements that have metrological traceability. He noted also that jurisdictions could already use alternative standards if controls are in place to validate their traceability. Mr. Oppermann and Mr. Murnane both forwarded written comments to the Committee in advance of the meeting opposing the adoption of these two items and recommending their status be changed from voting to developing.

Mr. Michael Keilty (Endress + Hauser Flowtec AG USA) stated that he would entertain a change to the terminology (transfer standard) in his proposals. He reported that some jurisdictions will not allow the use of a transfer standard unless it is mentioned in HB 44. He said that he agreed with Mr. Murnane and Mrs. Butcher that procedures would still need to be in place to ensure the adequacy of that standard for use in testing a commercial device. He recommended the Committee present the two items for vote.

Based on the concerns raised by numerous members during the open hearings and recommendations from all four regional associations, the Committee felt the two items in the group had merit, but more work is necessary to move them forward and the Committee agreed to downgrade them to a Developing status.

**Regional Association Comments:**
WWMA: The Committee has agreed to recommend that this item Be a Developing item, recommending it be harmonized with items New 6-15 and New 24-27 as the different terms used in these new items will affect their application. The Committee believes that the terms such as "Transfer Standard", "Testing Standards", "Verification (Testing) Standards", "Field Standards", "Field Reference Standard Meter", "Master Meter", etc. in New 6-15, and New 24-27 need to be defined and possibly standardized prior to further development of this item. The Committee is also concerned that Handbook 44 is not the appropriate place to specify the type of test equipment necessary for conducting tests.

SWMA: The Committee heard comments from Mrs. Tina Butcher (NIST OWM) on this item and 3307-2 noting that Val Miller will be looking at master meters and considering the development of a NIST HB 105-X which might address master meters. She noted that the issue of "master meters" is very broad and that it is necessary to consider the specific type (technology) of master meter used and the application where it will be used. During its work session, the Committee noted that the Measuring Sector also considered these items and is beginning work to address the use of one specific type of master meter as a starting point for developing further criteria for use in type evaluation. The Committee also acknowledged that Bob Murnane (Seraphin) provided written comments on this issue (see also the Committee's comments under Item New-6).

The Committee supports the concept of using "master meters" (and acknowledged that other terms have been and are being proposed) for various metering applications. The Committee believes there is still confusion over the terminology and that it is difficult to review multiple items related to the same basic issue.

The Committee recommends that this item remain Developing.

CWMA: The committee received statements from Seraphin asking this to be a Developing item. The committee agrees more development is necessary to keep up with changing technology in the marketplace and recommended that it be a Developing item.

NEWMA: This item has been recently modified by the submitter. It is currently being developed by the submitter. The committee believes this item has merit but should remain Developing at this time.

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

Return to Proposal

## LPG-5 D N.4.1.2. Repeatability Tests and N.4.2.4. Repeatability Tests for Type Evaluation

**Background/Discussion:**
The proposal is aimed to correct a number of areas of confusion. The inclusion of repeatability in the N.4.1. series indicates that repeatability is to be run at normal flow rates. The submitter believes that there is some confusion as to whether this was the actual intent and notes that running the tests only at Normal flow rates is consistently how the test was performed in the field. The proposed amendment to N.4.1.2. clarifies this explicitly for field tests and type evaluation tests.

The new paragraph regarding type evaluation is proposed because NTEP has, for a long time, required repeatability on tests over the entire range of flow rates conducted under controlled conditions during type evaluation testing. This means that these tests are conducted anywhere between rated maximum and minimum flow rates. The proposed addition would formalize and legitimize what has been done for a long time.

Another question that has arisen is whether gross or net results could be used in repeatability tests. Obviously, you can't compare net to gross but you can compare three consecutive gross or three consecutive net results. As the

practice in HB44 is to test one variable at a time to the extent possible, the proposed revision would clarify that repeatability is assessed on gross meter performance only. This can be accomplished by deactivating the ATC and conducting the repeatability tests or just using gross values where both gross and net are available from the same test draft.

At the Committee's 2017 Interim Meeting open hearings, the Committee heard support for the item from Mr. Dmitri Karimov (Liquid Controls) on behalf of the MMA.

Mrs. Tina Butcher (OWM) clarified that, although it is common for repeatability to be conducted at the normal flow rate, there is nothing precluding an inspector from running these tests at any valid flow rate. The meter should be expected to be repeatable at any flow rate throughout the approved range. OWM concurs with the submitter that the specific tolerances for "repeatability" found in the specific codes are located under the heading of "normal tests." There was also some discussion as to whether or not repeatability should only be applicable to gross or uncompensated meter readings. Some felt that the same requirements should also be applicable when testing a meter in net or compensated mode. OWM suggested that this may have unintended consequences. These may include errors or stability issues in the temperature compensation being interpreted as apparent repeatability issues.

Mr. Constantine Cotsoradis (Flint Hills Resources) also questioned whether or not repeatability requirements may be applied to the compensated, net registrations.

Mr. Michael Keilty (Endress & Hauser Flowtec AG) commented that the proposal should be further evaluated by the NTEP laboratories.

Mr. Karimov reminded the group that any changes to the requirements must consider all meter technologies and not just positive displacement (PD) meters.

Ultimately, the Committee agreed that more work was needed to develop the item and assigned it a "Developing" status. During its open hearings at the 2017 NCWM Annual Meeting, the Committee received comments from the submitter of this item, Mr. Ross Andersen (NY retired), supporting further development of this item. Mr. Andersen noted that he had submitted this item because he wanted to make clear in HB 44 that for field evaluation, repeatability tests are only to be conducted at normal flow rates (i.e., at flow rates consistent with paragraph N.4.1. Normal Tests). HB 44 also needs to clarify whether repeatability tests are to be conducted using temperature compensation or without temperature compensation. He further noted that NTEP evaluates these meters across all flow rates and that he would work with the MMA and the Measuring Sector to further develop this item.

In written comments submitted to the Committee, NIST OWM concurred with the need to make modifications to the measuring codes to clarify the application of repeatability criteria. OWM believes it is not clear whether the original intent was to limit the application of the repeatability tolerances in the specific codes to only certain types of tests. During discussion at the MMA meeting, it was noted that the 2001 Measuring Sector discussion included no reference to limiting repeatability tests to only normal tests, which causes question as to whether or not the location in the code is appropriate. Prior to the addition of repeatability tolerances in the measuring codes, only G-S.5.4. applied. When considering the addition of the repeatability requirements to the specific measuring codes, the W&M community felt strongly that a measuring device should be able to repeat its indications within a much smaller limit. Field officials should be able to verify a device is capable of repeating its indications at other flow rates and use conditions. Repeatability testing at other than normal flow rates should not be limited to type evaluation.

During the Committee's work session, the NIST Technical Advisor further noted that initially, OWM had questioned whether the 40 percent of the absolute value of maintenance tolerance was too tight to apply to the results of "Special Tests." However, during the MMA meeting at the 2017 Annual Meeting, it was noted that "Special Tests" are granted a larger tolerance. Thus, applying the "40 percent" value to the maintenance tolerances applied to special tests would result in applying a larger repeatability tolerance to those tests. Additionally, there was no mention of restricting the tolerances to only normal tests in either the S&T Committee or Measuring Sector reports when the tolerances were initially added. Consequently, testing at multiple flow rates seems appropriate and the code needs to be changed to clarify the intent.

Based on the comments heard and its work session discussions, the Committee agreed to recommend this item be further developed.

**Regional Association Comments:**
WWMA: The Committee has agreed to recommend this item be a Developing item as work is continuing by the OWM, MMA, and submitter.

SWMA: The Committee heard no comments on this item. During its work session, the Committee noted that the Measuring Sector discussed this item and may have recommendations to make to the submitter. The Committee acknowledged additional work is needed on the item and recommends the item remain Developing.

CWMA: The committee believes this item pertains specifically to mechanical compensators, and is not necessary for today's technology. The CWMA recommended that the item be Withdrawn.

NEWMA: A comment was heard that the test currently being conducted by NTEP did not have any legal basis. The language in this item merely allows NTEP to conduct the same test legally. The committee believes this item is fully developed and ready to be voted upon.

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

Return to Proposal

## WTR – WATER METERS

### WTR-2 S.2.1. Provision for Sealing and Table S.2.1. Categories of Device and Methods of Sealing

**Background / Discussion:**
Water Meter submitted to NTEP now have digital registers instead of the old analog odometer type of registers. The current water meter code section 3.36 S.2.1. provision of sealing, seems to only allow for a physical sealing provision. Digital registers use a remote device or even Near Field Communication (NFC). Because of the digital technology changes, MCWM should adopt the three categories for sealing into the water meter code to allow for audit trail event counter (Cat. 2) or event logger (Cat. 3) because a physical seal won't protect or even be tamper evident. Remote or NFC has the capability to change the unit of measure from gallons to cubic feet or even the calibration factor. We need the guidelines of cat. 2 or 3 to properly seal meters that are digital. Otherwise, water meters using today's technology cannot be certified by NTEP.

**Regional Association Comments:**
WWMA: The Committee has agreed to recommend this item go forward as a Voting item with the following change:

Add a non-retroactive date that specifies the date in which an audit trail if provided must use the format set forth in Table S.2.1.

SWMA: The Committee heard no comments on this item. The Committee acknowledged that, while there are some dates specified in the proposed table, there is no date specified under paragraph S.2.1. for the effective date of the table as a whole. The Committee recommends that this be a Voting item with the recommendation that the NCWM S&T Committee specify an effective date prior to the vote.

CWMA: The committee heard no comments on this item. The committee believes this item is fully developed and ready to be voted upon.

NEWMA: No comments were heard on this item. The committee determined that this item has merit and is fully developed. It is recommended to move forward as a vote.

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

Return to Proposal

## MFM – MASS FLOW METERS

### MFM-2 D N.3. Test Drafts.

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

Michael Keilty
Ph: 970-586-2122
Mobile: 317-701-0823
michael.keilty@us.endress.com

**Background / Discussion:**
The use of transfer standards is recognized in Code sections 3.34 Cryogenic Liquid-Measuring Devices Code and 3.38 Carbon Dioxide Liquid-Measuring Devices Code and 3.39 Hydrogen Gas-Measuring Devices – Tentative Code. Transfer standard is only defined for testing cryogenic liquid measuring devices. It has been pointed out that the term transfer standard is not correct and that field reference standard meters may be more appropriate. See new the item under consideration, updated on September 8, 2017.

Field evaluation of LPG meters and CNG dispensers and LNG dispensers is very difficult using volumetric and gravimetric field standards and methods. The tolerances for these applications are such that using field reference standard meters are more efficient and safer. With CNG and LNG and LPG applications, the field reference standard meters are placed in-line with the delivery system as it is used to fill tanks and vehicles. The use of field reference standard meters eliminates return to storage issues. The use of field reference standard meters is easier and faster compared to the use of traditional field standards. The cost of using field reference standard meters and transporting them is much less than the cost of traditional field provers and standards.

Recognition in Handbook 44 will enable States to allow field reference standard meters to place systems into service and for field enforcement.

Volumetric field provers and gravimetric field proving are susceptible to environmental influences. The State of Colorado uses a field reference standard meter to test propane delivery truck meters. The State of Nebraska has used a field reference standard meter to test agricultural chemical meters. Other States have asked that there be recognition in HB44 in order for their State to allow the use of field reference standard meters.

In some applications, field reference standard meters are not more accurate than the meters used in the application. For that reason, longer test drafts and possibly more tests may need to be run.

The State of California is purported to have conducted a short study of field reference standard meters in the past. The conclusion did not lead to wide adoption of the practice.

Section 3.37 Mass Flow Meters user requirement U.R.3.8. Return of Product to Storage, Retail Compressed Natural Gas Dispensers requires that the natural gas which is delivered into the test container must be returned to storage. This is difficult and most often not complied with when the test vessel contents are released to atmosphere. States often have difficulties in remote locations finding suitable field reference equipment.
In the fall of 2016, Mr. Keilty provided an update to the Item under Consideration. That update appears in the agenda. The previous proposed Item under Consideration was as follows:

**N.3. Test Drafts. –**

**N.3.1 Minimum Test -** Test drafts should be equal to at least the amount delivered by the device in one minute at its normal discharge rate.
(Amended 1982)

**N.3.2. Transfer Standard Test. – When comparing a meter with a calibrated transfer standard, the test draft shall be equal to at least the amount delivered by the device in 2 minutes at its maximum discharge rate.**

The submitter recommends that NIST update EPO 28 for CNG dispensers and EPO 26 for LPG Liquid Measuring Systems to include transfer standard meter tests. NIST Publication R 105-4 should also be revised to specifically address the transfer standard meter and the requirements for use.

The S&T Committee might also consider amending Sections 3.30 Liquid-Measuring Devices Code and 3.31 Vehicle-Tank Meters Code to allow transfer standard meters.

**2015 Interim and Annual Meetings:**
The Committee heard comments both in support of and in opposition to the proposal outlined in this item and a corresponding item in the LPG and Anhydrous Ammonia Liquid-Measuring Devices Code. Mr. Mike Keilty (Endress + Hauser Flowtec AG USA), submitter of these two items outlined the benefits of using a master meter as a standard in testing application such as CNG, LNG, and LPG. The Committee heard comments in opposition to the proposal from Henry Oppermann (Weights and Measures Consulting, LLC and speaking on behalf of Seraphin Test Measure, Co) noted there are significant differences between a transfer standard and a field standard. Mrs. Tina Butcher (NIST OWM) acknowledged the advantages to identifying and developing alternate test methods such as this, but noted that simply adding the proposed language doesn't address the multiple other elements that need to be in place to ensure traceability; OWM provided a list of those elements along with other suggestions. OWM noted that the USNWG on Alternative Test Methods might be a better venue to develop the elements to support the use of these devices. This was echoed by Mr. Dmitri Karimov (Liquid Control, LLC) who also commented that the regulatory authority must assess the suitability of a given standard. The Committee also heard from Ms. Kristin Macey (CA) who commented that if the proposal were adopted, it would allow use of a transfer standard and California would not be able to fully support it, citing results of comparison testing conducted by CA in which the master meter performed worst of the three methods examined. Mr. Keilty, in response to Mrs. Butcher's and Mr. Oppermann's comments, stated that he agreed completely and noted that adding the paragraph to these two codes is a step towards allowing the use of transfer standards and it's understood that there are many things that would need to be in place in order that they be considered suitable for use in testing. The Committee also heard other comments from regulators and industry supporting the continued development of this issue. The Committee agreed that the item has merit, but needs further development and suggested the submitter work with OWM by providing data for the USNWG to consider.

See the Committee's 2015 Final Report for details.

**2016 NCWM Interim and Annual Meetings:**
The Committee again heard comments both in support of and in opposition to this item and the corresponding item in the LPG and Anhydrous Ammonia Liquid-Measuring Devices Code. Mr. Michael Keilty (Endress + Hauser Flowtec), the submitter, stated that he supported this item as a voting item as did Alan Walker (FL). Others expressed support of the item, but noted the need for additional development. The Committee heard again from

Mrs. Tina Butcher and Mr. Henry Oppermann, who reiterated their 2015 detailed comments regarding the tasks that need to be completed before considering changes to Handbook 44. Both echoed the need to collect data in order to properly evaluate whether or not a master meter could be considered a suitable standard.

During its Interim Meeting work session, the Committee acknowledged comments suggesting the need for additional test data. It was also acknowledged that there was a lot of support for the proposal. Those supporting the proposal had indicated that using a transfer standard is much easier and faster than testing gravimetrically and eliminates the need to discharge product from a prover into the atmosphere, which is viewed by many as a safety concern. Given that the addition of the proposed language would not dictate the method of testing and the decision on whether or not to use a particular method of testing would remain with each jurisdiction, the Committee agreed to present both items for vote at the Annual Meeting.

At the 2016 Annual Meeting, the Committee received numerous comments from industry and regulators alike, predominantly in support of the proposals. These comments cited benefits such as safety; faster and more efficient testing; and lack of problems with using master meters. Mr. Marc Buttler (Emerson Process Management – Micro Motion) also expressed supports of the items, but suggested replacing the words "maximum discharge rate" with "maximum test rate" in proposed paragraph N.3.2.; the submitter agreed with the suggestion.

The Committee also heard comments in opposition to the item and comments emphasizing the need for further development and data. A new comment offered by Mrs. Tina Butcher (NIST OWM) noted that the proposed new paragraph N.3.1. would create a conflict with the minimum test procedures outlined in the NIST EPO for CNG dispensers since tests conducted at the MMQ and at some other quantities are frequently completed in less than one minute. There was also some debate regarding the application of the Fundamental Considerations with regard to the allocation of error and uncertainty associated with a given test method and Mr. Henry Oppermann clarified the proper application of these criteria. Mr. Oppermann noted that transfer standards, in some cases, are no more accurate than the meter being tested and that the proposals lack a specification associated with the performance of the standard. He recommended the items be downgraded to Informational or Developmental.

During the Committee's work session, members of the Committee agreed that the comments received during the open hearings were mostly in support of the two proposals. The Committee discussed the proposed changes to the text, including the errors in the transcription of the text in the Item Under Consideration. The Committee discussed the potential impact on testing CNG dispensers, acknowledging that the proposed requirement cannot be met by someone wanting to apply the procedures in the NIST EPO (which were developed through a work group comprised of industry and regulatory officials). Some Committee members familiar with CNG testing concurred that a test run typically takes less than one minute to complete. The Committee was concerned with the potential conflict and questioned whether the submitter had fully considered the impact of the proposed language. These discussions led the Committee to decide to change the status of the item from Voting to Developmental and return them to the submitter for further development.

See the Committee's 2016 Final Report for details

**2017 NCWM Interim and Annual Meetings:**
During the 2017 NCWM Interim and Annual Meetings, the Committee grouped Agenda Item 3302-1 and 3307-2 together and took comments on these items simultaneously because it considered these items related. See Agenda Item 3302-1 for a summary of the comments received and the resulting actions taken by the Committee on these items at those meetings.

**Regional Association Comments:**
WWMA: The Committee has agreed to recommend this item be Withdrawn. The requirement in proposed N.3.1 Minimum Test requiring the minimum test shall be one test draft at the maximum flow rate of the installation is not possible for current testing equipment or NIST EPO's including gravimetric or flow meter testing of CNG retail motor fuel devices.

SWMA: The Committee heard comments on both Items 3302-1 and 3307-2. The Committee heard comments from Mrs. Tina Butcher (NIST OWM) on this item and 3307-2 noting that Val Miller will be looking at master meters and considering the development of a NIST HB 105-X which might address master meters. She noted that the issue of "master meters" is very broad and that it is necessary to consider the specific type (technology) of master meter used and the application where it will be used. During its work session, the Committee noted that the Measuring Sector also considered these items and is beginning work to address the use of one specific type of master meter as a starting point for developing further criteria for use in type evaluation. The Committee also acknowledged that Bob Murnane (Seraphin) provided written comments on this issue (see also the Committee's comments under Item New-6). The Committee supports the concept of using "master meters" (and acknowledged that other terms have been and are being proposed) for various metering applications. The Committee believes there is still confusion over the terminology and that it is difficult to review multiple items related to the same basic issue. The Committee recommends that this item remain Developing.

CWMA: The committee received statements from Seraphin asking the item be Developing. The committee agrees this item should remain Developing, and the year "1982" be removed.

NEWMA: This item was recently modified by the submitter. No comments were heard. The item is still being developed and the committee recommends it remain in Developing status.

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

Return to Proposal

# TXI – TAXIMETERS

## TXI-1 S.1.2.2. Distance Mechanism and S.1.5.3. Distance Not Recording.

**Background/Discussion:**
Paragraphs S.1.2.2. and S.1.5.3. are newly added requirements in the HB44 Taximeters Code that would require that a mechanism be included on a taximeter that would disable or suspend the use of distance measurements for the calculation of fare charges. It is not believed that any existing taximeters are equipped with such a feature at this time and that this would be a design change affecting most if not all taximeter manufacturers. It was recognized after these amendments had been voted on and adopted at the July 2017 NCWM Annual Meeting that these proposals did not specify an effective date but instead listed that effective date as *"Nonretroactive as of January 1, 20XX."* Unless specified otherwise, it is customary to assign an effective date for a requirement as January 1 in the year following the requirement's adoption, in this case January 1, 2018.

Since no specific year was provided as an effective date for these two requirements, it is inferred that there was no intent to provide additional time for manufacturers of these devices to redesign their products to incorporate a feature that could disable the use of distance travelled as a means to calculate fare charges.

Because the changes required would likely cause taximeter manufacturers to redesign software and hardware elements in their product line, it is considered reasonable to provide additional time for the necessary changes to be incorporated into new devices. Amending the nonretroactive effective dates from January 1, 2018 to January 1, 2020 would provide taximeter manufacturers an additional two years to incorporate the necessary changes in their new products.

Taximeter manufacturers may oppose the proposed effective date of January 1, 2020 if they do not believe that they will be capable of complying with the required changes to their products in the time allotted (from the present until 1/1/2020) prior to the requirement being enforced.

**Regional Association Comments:**
WWMA: The Committee has agreed to recommend this item be carried forward as voting item as it corrects this section of the code to bring it into conformance with the original intent allowing the industry time to comply with the requirements.

SWMA: The Committee heard comments from Mrs. Tina Butcher (NIST OWM) who provided history of the item. She noted that, when revisions were made to the Taximeters Code in July 2017, there was an oversight in designating a specific non-retroactive date; a date of 20XX was specified in the proposal when it was adopted. The standard approach for addressing a "20XX" date has been to use a date of the subsequent calendar year. Thus, OWM used 2018 as the specified date. However, there were concerns that taximeter manufacturers may have been anticipating a later date. Consequently, OWM polled the USNWG on Taximeters and is proposing a modification to the date as specified in the proposal. The Committee heard no other comments or opposition to the proposed change and recommends that this be a Voting item.

CWMA: Don Onwiler explained there was an oversight in the timing of the implementation date which could adversely affect industry, and therefore the committee believes the item should be a Voting item.

NEWMA: Mike Sikula (NYS) New York supports this item. This item has been fully developed and is recommended to move forward as a Voting item.

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

Return to Proposal

# OTH – OTHER ITEMS

## OTH-5 D Electric Watthour Meters Code under Development

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

Tina Butcher
Chairman to the NIST USNWG on Electric Vehicle Refueling and Submetering
301-975-2196
tbutcher@nist.gov

or

Juana Williams
Technical Advisor to the NIST USNWG on Electric Vehicle Refueling and Submetering
301-975-3989
juana.williams@nist.go

**Background/Discussion:**
The creation of Developing Items on both the L&R and S&T Committee agendas will provide for a venue to allow the USNWG to update the weights and measures community on continued work to develop test procedures and test equipment standards. This item will also provide a forum for reporting on work to develop proposed method of sale requirements for electric watthour meters and a tentative device code for electric watthour meters in residential and business locations and serve as a placeholder for eventual submission of these proposals for consideration by NCWM.

The Committee received an update on this item from Mrs. Tina Butcher (OWM), Chairman of the USNWG on Electric Refueling & Submetering at both the 2016 NCWM Interim and Annual Meetings. See the Committee's 2016 Final Report for details of those updates.

During the 2017 NCWM Interim Meeting, Mrs. Tina Butcher (NIST OWM), Chairman of the USNWG on Electric Vehicle Refueling & Submetering, provided an update on the progress of the USNWG. She noted that, when the USNWG was initially created, it was charged with addressing *all* electric submeters, including commercial electric vehicle refueling systems as well as commercial utility-type electric watthour meters under the purview of weights and measures jurisdictions (rather than public utility commissions or similar entities). Shortly after beginning its work, the USNWG agreed to focus its initial efforts on developing proposed requirements, test procedures, and field standard criteria for commercial electric vehicle refueling metering systems. In July 2015, after several years of intensive work by the USNWG, a tentative code for electric vehicle refueling systems was presented to and adopted by the NCWM.

In December 2015, the USNWG discussed plans to resume work on electric watthour meter requirements, including the development of a proposed NIST HB 44 code. A draft code derived from one initially circulated in 2014 was re-distributed to the USNWG in December 2015, with a deadline for comments in February 2016. This deadline was ultimately extended to March 2016 at the request of some work group members. The USNWG recently agreed upon revisions to its charter, which includes dividing the larger USNWG into two parts: one to address Electric Vehicle Refueling Equipment and one to address Electric Watthour Metering Systems. OWM continues to analyze and compile comments received on the draft code.

Work continues on test equipment standards and test procedures for Electric Vehicle Refueling Equipment, under a subcommittee, Chaired by Mr. Ted Bohn, (Argonne National Laboratory), within the original USNWG. The USNWG's next step is to reconvene the USNWG and begin review of the comments on the draft watthour meters code. The Technical Advisor to the USNWG, Ms. Juana Williams, will be polling members on dates for (1) a short, web-based conference to review the overall plan for drafting requirements and procedures for watthour meters; and (2) an in-person meeting to begin reviewing and discussing comments received on the draft NIST Handbook 44 watthour meters code and agreeing upon needed changes. NIST OWM appreciates the diligent work of the USNWG members in collaborating on the development of these much-needed standards.

Those interested in the work can contact Mrs. Tina Butcher, Chairman, at tbucher@nist.gov or Ms. Juana Williams, Technical Advisor, at jwilliams@nist.gov.

At the 2017 NCWM Annual meeting, the Committee received an update on this item from Mrs. Tina Butcher (NIST OWM), Chairman of the USNWG on Electric Vehicle Refueling & Submetering, very similar to the one she provided during the 2017 NCWM Interim Meeting. In addition, however, to explaining the charge of the USNWG on Electric Vehicle Refueling & Submetering and providing an historical account of its significant accomplishments and its current focus, she also announced that the first face-to-face meeting of the Watthour Type Electric Meter (WHE) Subgroup will be held September 12-14 in Sacramento, CA. and that work continues on test equipment standards and test procedures for Electric Vehicle Refueling Systems.

The Committee agreed to maintain its developing status on this item based on the update provided and the ongoing work of the USNWG.

**Regional Association Comments:**
WWMA: The Committee has agreed to recommend this item remain a Developing item as there is continuing work by the US National Work Group.

SWMA: The Committee heard an update on this issue from Mrs. Tina Butcher, NIST OWM, submitter of this item. Mrs. Butcher reported the USNWG on Electric Vehicle Refueling and Submetering has begun work on development of a draft NIST Handbook 44 code for utility type electric watthour meters used in submetering applications. She indicated the group held a face-to-face meeting in Sacramento, CA in mid-September and has made good progress on the draft code. The group plans another short meeting in November followed by another, longer meeting in early

Spring. The group hopes to finish review and revision of the code and submit a final draft for review by the regions in fall 2018. NIST OWM will continue to provide updates on the Work Group's progress and encourages anyone interested in participating in the work (as an active member or observer) to contact Work Group Chairman, Lisa Warfield (lisa.warfield@nist.gov) or Technical Advisor, Tina Butcher (tina.butcher@nist.gov). The SWMA recommended that his item remain Developing.

CWMA: The committee heard no comments on this item and recommends leaving this as Developing.

NEWMA: This item is currently being developed as an item on the L&R committee agenda. The USNWG is still developing this item and committee recommends it be designated as Developing.

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

Return to Proposal

## OTH-6 Appendix D – Definitions: Batch (Batching)

**Background / Discussion:**

When batching occurs during and as part of the weighing or measuring process special considerations should be made to ensure equity is preserved. This definition will help manufacturers, users, and regulators determine when batching is metrologically significant.

Batch or batching are terms used to define devices in Sections 2.20, 3.36, and in several definitions in Appendix D yet there is no guidance for the regulatory official to determine what constitutes a "batch" or "batching" operation. Section 2.20 Scales has a specification, *S.1.2. Value of Scale Division Units*, and a tolerance, T.3. Sensitivity Requirement, Equilibrium Change Required. (c) Scale with a Single Balance Indicator and Having a Nominal Capacity of 250 kg (500 lb) or Greater., that are applied differently to batching scales. Section 3.36 Water Meters has a specification, test procedure, and user requirement that are specifically for batching meters. Having a definition will promote consistency in the way the devices are evaluated.

To many weights & measures officials, it may seem obvious what is implied by the terms batch or batching. As the number of devices that don't conform to the common conception of what a batching device is increases, there is a greater need for defining what the term means.

**Regional Association Comments:**

WWMA: The Committee agrees to recommend that this item be withdrawn as it does not feel that this term needs to be defined based on its current use in Handbook 44. In addition, this definition identifies only one type of batching operation when there are many different uses of the term "batch (batching)" currently in use.

SWMA: The Committee heard comments from Richard Suiter (Richard Suiter Consulting) who opposed the proposal, noting that the definition conflicts with many systems that are currently in the field. The definition only refers to one type of system. The Committee heard no other comments on the item. Given the comments received in opposition to the proposal and the other items addressing batching systems, the Committee recommends the item be withdrawn.

CWMA: The submitter chose to withdraw this item based on the inability to reach a consensus on the definition of "Batch".

NEWMA: No comments were heard on this item. The committee recommends this item be designated with Developing status.

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

Return to Proposal