Specifications and Tolerances (S&T) Committee
2020 Interim Meeting Agenda

Mr. Loren Minnich, Committee Chair
Kansas

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 *Handbook 44 Specifications, Tolerances, and Other Technical Requirements for Weighing and Measuring Devices, 2019 Edition*. The first three letters of an item's reference key are assigned from the Subject Series List. The next 2 digits represent the year the item was introduced. 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

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)

GEN – GENERAL CODE

GEN-20.2 G-T.1. Acceptance Tolerances

Source:
Arizona Department of Agriculture, Weights and Measures Services Division

Purpose:
Clarify whether acceptance tolerance should be applied following calibration of equipment.

Item Under Consideration:
Amend NIST Handbook 44 General Code by adding the following new paragraph:

G-T.1. Acceptance Tolerances. – Acceptance tolerances shall apply to equipment:

(a) to be put into commercial use for the first time;
(b) that has been placed in commercial service within the preceding 30 days and is being officially tested for the first time;
(c) that has been returned to commercial service following official rejection for failure to conform to performance requirements and is being officially tested for the first time within 30 days after corrective service;
(d) where evidence exists that calibration has been performed within the past 30 days;
~~(d)~~ (e) that is being officially tested for the first time within 30 days after major reconditioning or **overhaul; and**
~~(e)~~ (f) undergoing type evaluation.
(Amended **~~1989~~ XXXX)**

Background/Discussion: See Appendix A, Page S&T-A238.

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

BLOCK 2 ITEMS (B2) DEFINE TRUE VALUE FOR USE IN ERROR CALCULATIONS

Source:
Ross Andersen (Retired)

Purpose:
This proposal has four parts:
1. Clarify the concepts in determining error in verification
2. Correct Code references to ensure correct reference to either e or d, as appropriate
3. Correct Code references regarding issues of scale suitability Table 8
4. Explain why e and d are not connected

B2: GEN-20.1 G-T.3. Application and Appendix D – Definitions: true value

Item Under Consideration:
Amend NIST Handbook 44 General Code as follows:

G-T.3. Application. ~~**Tolerances "in excess" and tolerances "in deficiency" shall apply to errors in excess and to errors in deficiency, respectively. Tolerances "on overregistration" and tolerances "on underregistration" shall apply to errors in the direction of overregistration and of underregistration, respectively.**~~ **Measurement errors shall be in reference to the "true value," which shall be the legal basis of all tolerance compliance. The calculation of measurement error in testing shall follow these principles:**

(a) When tolerances in a code are expressed as tolerances "in excess" and tolerances "in deficiency," error shall be calculated as: Error = True Value – Device Indication. Plus (+) errors are "in excess" and minus (+) errors are "in deficiency". These errors may also be known as "errors of delivery."

(b) When tolerances in a code are expressed as tolerances "on overregistration" and tolerances "on underregistration," error shall be calculated as: Error = Device Indication – True Value." Plus (+) errors are "on overregistration" and minus (+) errors are "on underregistration." These errors may also be known as "errors of indication."

(c) The percent error in all cases shall be calculated as: Error% = Error / True Value * 100 Example: if the error is +1 g and the true value is 100 g, the error% is +1 %

(Also see Appendix D, Definitions.)
(Amended 20XX)

And amend Appendix D – Definitions as follows:

True Value. – A value representing the quantity of a reference used in evaluating tolerance compliance, which is obtained using prescribed, traceable standards and a prescribed test procedure preformed by an authorized person. The true value is expressed without uncertainty and is considered to have no error. The true value may by assigned prior to conducting the test or during the conduct of the test. Examples: When testing a scale using a test weight, the true value of the test weight is typically assigned by an authorized laboratory prior to conducting the test. When testing a liquid measuring device, the true value of the test draft is assigned by the authorized inspector during the conduct of the test.
(Added 20XX)

B2: SCL-20.1 N.1.12. Reducing Rounding Error, T.1. General, T.N.2.1. General.

Item Under Consideration:
Amend NIST Handbook 44 Scales Code as follows:

N.1.12. Reducing Digital Rounding Error. – When verifying devices with digital indication, the rounding error resulting from rounding the indication to the nearest digital division shall be reduced whenever the scale division d is greater than 0.2 e. Reduction shall be made using error weights or other means. This shall not apply to field verifications when environmental conditions make the error determination to at least 0.2 e unreliable.

T.1. General. – The tolerances applicable to devices not marked with an accuracy class shall have the tolerances applied as specified in Table T.1.1. Tolerances for Unmarked Scales. **The tolerances hereinafter prescribed shall be applied equally to errors of overregistration and errors of underregistration with the weighing device adjusted to zero at no load. When tare is used, the tolerance values are applied from the tare zero reference (zero net weight indication); the tolerance values apply to the net weight indication for any possible tare load using certified test loads.**
(Amended 1990 **and 20XX)**

T.N.2.1. General. – The tolerance values ~~**are positive (+) and negative (-)**~~ **hereinafter prescribed shall be applied equally to errors of overregistration and errors of underregistration** with the weighing device adjusted to zero at no load. When tare is used, the tolerance values are applied from the tare zero reference (zero net weight indication); the tolerance values apply to the net weight indication for any possible tare load using certified test loads.
(Amended 2008 **and 20XX**)

B2: SCL-20.2 Verification Scale Division

Item Under Consideration:
Amend NIST Handbook 44 Scales Code as follows:

S.1.2.2. ~~Verification Scale Interval.~~ Scales with e Not Equal to d.

Move S.1.2.2.2. to Section 3 of the user requirements (or delete it) and renumber subsequent paragraphs.

Option 1. Move S.1.2.2.2. to User Requirements Section 3.

~~S.1.2.2.2.~~ UR.3.X. Class I and II Scales Used in Direct Sales. *– When accuracy Class I and II scales are used in direct sale applications the value of the displayed division "d" shall be equal to the value of the verification scale interval "e."*
[Nonretroactive as of January 1, 2020; to become retroactive as of January 1, 2023]
(Added 2017) **(Amended 20XX)**

Option 2. DeleteS.1.2.2.2. and renumber

~~***S.1.2.2.2. Class I and II Scales Used in Direct Sales. When accuracy Class I and II scales are used in direct sale applications the value of the displayed division "d" shall be equal to the value of the verification scale interval "e."***~~
~~***[Nonretroactive as of January 1, 2020; to become retroactive as of January 1, 2023]***~~
~~**(Added 2017)**~~

B2: SCL-20.3 S.5.4. Relationship of Minimum Load Cell Verification Interval to the Scale Division

Item Under Consideration:
Amend NIST Handbook 44 Scales Code as follows:

S.5.4. Relationship of Minimum Load Cell Verification Interval Value to the Scale Division. *– The relationship of the value for the minimum load cell verification scale interval, v_{min}, to the verification scale division, ~~d~~ e, for a specific scale using National Type Evaluation Program (NTEP) certified load cells shall comply with the following formulae where N is the number of load cells in a single independent[1] weighing/load-receiving element (such as hopper, railroad track, or vehicle scale weighing/load-receiving elements):*

(a) $v_{min} \leq \frac{\sim\!\!d^{*}\ e}{\sqrt{N}}$ *for scales without lever systems; and*

(b) $v_{min} \leq \frac{\sim\!\!d^{*}\ e}{\sqrt{N} \times (scale\ multiple)}$ *for scales with lever systems.*

[1]"Independent" means with a weighing/load-receiving element not attached to adjacent elements and with its own A/D conversion circuitry and displayed weight.

~~*[*When the value of the scale division, d, is different from the verification scale division, e, for the scale, the value of e must be used in the formulae above.]*~~

This requirement does not apply to complete weighing/load-receiving elements or scales, which satisfy all the following criteria:

- *the complete weighing/load-receiving element or scale has been evaluated for compliance with T.N.8.1. Temperature under the NTEP;*

- *the complete weighing/load-receiving element or scale has received an NTEP Certificate of Conformance; and*

- *the complete weighing/load-receiving element or scale is equipped with an automatic zero-tracking mechanism which cannot be made inoperative in the normal weighing mode. (A test mode which permits the disabling of the automatic zero-tracking mechanism is permissible, provided the scale cannot function normally while in this mode.*

[Nonretroactive as of January 1, 1994]

(Added 1993) (Amended 1996, ~~and~~ 2016, and 20XX)

B2: SCL-4 Table 3. Parameters of 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* ***e[1]*** ~~***(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.***~~ ***The manufacturer may design a scale such that the verification scale division e does not be equal to the scale division d. To ensure the correct value for e is used, refer to marking requirements in footnotes 3 and 4 to Table S.6.3.a. and Table S.6.3.b.***
(Amended 20XX)

[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*~~ *the verification scale division (e) for crane and hopper (other than grain hopper) scales shall be not be less than 0.2 kg (0.5 lb). The minimum number of scale divisions shall be not be less than 1000.*
(Amended 20XX)

[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-20.5 Table S.6.3.a. Marking Requirements, Note 3.

Item Under Consideration:
Amend NIST Handbook 44 Scales Code as follows:

3. The device shall be marked with the nominal capacity. *The nominal capacity shall be shown together with the value of the scale division "**d**" (e.g., 15 × 0.005 kg, 30 × 0.01 lb, or capacity = 15 kg, d = 0.005 kg) in a clear and conspicuous manner and be readily apparent when viewing the reading face of the scale indicator unless already apparent by the design of the device. Each scale division value* ~~*or weight unit*~~ ***with its associated nominal capacity*** *shall be marked on multiple range or multi-interval scales.* ***In the absence of a separate marking of the verification scale division "e" (see Note 4), the value of the verification scale division e shall be equal to the value of the scale division d.***

[Nonretroactive as of January 1, 1983] ***(amended 20XX)***

(Amended 200**5 and 20XX)**

B2: SCL-20.6 T.N.1.2. Accuracy Classes and T.N.1.3. Scale Division.

Item Under Consideration:
Amend NIST Handbook 44 Scales Code as follows:

T.N.1.2. Accuracy Classes. – Weighing devices are divided into accuracy classes according to the number of scale divisions (n) and the value of the verification scale division ~~(d)~~ (e).

T.N.1.3. Scale Division. – **This Code contains references to two types of scale divisions, the verification scale division (e) and the scale division (d) (see definitions in Appendix D.).** The tolerance for a weighing device is in the order of magnitude of ~~related to the value of the scale division (d) or the value of~~ the verification scale division (e) and is generally expressed in terms of ~~**d or**~~ **e. Other technical requirements may reference either the verification scale division (e) or scale division (d) as appropriate. The values of (e) and (d) are chosen by the manufacturer and are marked on the device pursuant to S.6.3., except that d is not used in reference to an analog device, such as an equal-arm balance, where the graduations do not correspond to units of weight.**

B2: SCL-20.7 Table 7. Maintenance Tolerances

Item Under Consideration:
Amend NIST Handbook 44 Scales Code as follows:

Table 6.
Maintenance Tolerances
(All values in this table are in verification scale divisions)

Tolerance in Verification Scale Divisions						
	1	**2**		**3**		**5**
Class	**Test Load**					
I	0 - 50 000	50 001 -	200 000	200 001 +		
II	0 - 5 000	5 001 -	20 000	20 001 +		
III	0 - 500	501 -	2 000	2 001 -	4 000	4 001 +
IIII	0 - 50	51 -	200	201 -	400	401 +
III L	0 - 500	501 -	1 000	(Add 1 ~~d~~ e for each additional 500 ~~d~~ e or fraction thereof)		

B2: SCL-20.8 Table 8. Recommended Minimum Load

Item Under Consideration:
Amend NIST Handbook 44 Scales Code as follows:

Table 8.
Recommended Minimum Load

Class	Value of Scale Division (d or e~~*~~)*	Recommended Minimum Load (d or e~~*~~)*
I	equal to or greater than 0.001 g	100
II	0.001 g to 0.05 g, inclusive	20
	equal to or greater than 0.1 g	50
III	All**	20
III L	All	50
IIII	All	10

~~***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. For Class III and IIII devices the value of "e" is specified by the manufacturer as marked on the device; "e" must be less than or equal to "d."~~** ***Scales manufacturers are permitted to design scales where the value a verification scale division e differs from the displayed scale division d. If the marked value of e is less than the value of d, use e in interpreting the Table. In all other cases use the value of d. Refer to marking requirements for d and e in footnotes 3 and 4 to Table S.6.3.a. and Table S.6.3.b.***
(Amended 20XX)

**A minimum load of 10 ~~d~~ e is recommended for a weight classifier marked in accordance with a statement identifying its use for special applications.

(Amended 1990) **(Amended 20XX)**

Background/Discussion: See Appendix A, Page S&T-A239.

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

SCL – SCALES

SCL-17.1 I S.1.8.5. Recorded Representations, Point of Sale Systems, Appendix D-Definitions: tare

Source:
Kansas and Minnesota

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, as is currently afforded them when witnessing items being weighed and priced in their presence using other scales in the store.

Item Under Consideration:

[Note: At the 2019 NCWM Annual Meeting, the Committee agreed with the assigned Task Group (TG) to change the status of this proposal from Assigned to Informational. The TG presented the Committee with two versions for revising the original proposal. Both versions are shown below. The Committee accepted both versions with the intent of soliciting feedback from the 2019 Fall Regional meetings on which version is preferred.]

Amend NIST Handbook 44, Scales Code as follows:

1. RETROACTIVE VERSION:

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:~~1~~

(a) the net weight;~~1~~

(b) the unit price; ~~1~~ 2

(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.

In addition, the tare weight shall be recorded by all cash registers interfaced with a weighing element for items weighed at the checkout stand as of January 1, 20XX.
(Amended 20XX)

FOOTNOTES 1 AND 2 FOR EITHER VERSION (RETROACTIVE OR NONRETROACTIVE)

[1]Weight values shall be **adequately defined as gross, tare, and/or net upon any two or more of these values appearing on the receipt. Acceptable abbreviations include, but are not limited to, G & GR (gross), T & TA (tare), and N & NT (net). The unit of weight shall be** identified ~~by~~ **as** kilograms, kg, grams, g, ounces, oz, pounds, or lb. ~~*The "#" symbol is not acceptable.*~~
~~*[Nonretroactive as of January 1, 2006]*~~

2For devices interfaced with scales indicating in metric units, the unit price may be expressed in price per 100 grams.
(Amended 1995**,** ~~and~~ 2005, **and 20XX**)

***THE FOLLOWING TEXT CAN BE INSERTED AS REPLACEMENT TO THE ABOVE ONCE THE PRINTING OF THE TARE WEIGHT INFORMATION BECOMES ENFORCEABLE:**

[1]Weight values shall be **adequately defined as gross, tare, and/or net. Acceptable abbreviations include, but are not limited to, G & GR (gross), T & TA (tare), and N & NT (net). The unit of weight shall be identified** ~~by~~ **as** kilograms, kg, grams, g, ounces, oz, pounds, or lb. ~~*The "#" symbol is not acceptable.*~~
~~*[Nonretroactive as of January 1, 2006]*~~

2For devices interfaced with scales indicating in metric units, the unit price may be expressed in price per 100 grams.
(Amended 1995**,** ~~and~~ 2005, **and 20XX**)

2. NONRETROACTIVE VERSION:

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**1**:

(a) the net weight;~~1~~

(b) the unit price; ~~1~~ 2

(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**~~.~~; and**

(e) the tare weight.

[Non-retroactive as of January 1, 20XX]

(Amended 20XX)

FOOTNOTES 1 AND 2 FOR EITHER VERSION (RETROACTIVE OR NONRETROACTIVE)

[1]Weight values shall be **adequately defined as gross, tare, and/or net upon any two or more of these values appearing on the receipt. Acceptable abbreviations include, but are not limited to, G & GR (gross), & TA (tare), and N & NT (net). The unit of weight shall be** identified **~~by~~ as** kilograms, kg, grams, g, ounces, oz, pounds, or lb. ***~~The "#" symbol is not acceptable.~~***
~~[Nonretroactive as of January 1, 2006]~~

[2]For devices interfaced with scales indicating in metric units, the unit price may be expressed in price per 100 grams.

(Amended 1995**~~, and~~** 2005, **and 20XX**)

Background/Discussion: See Appendix A, Page S&T-A246.

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

SCL-16.1 A Sections Throughout the Code to Include Provisions for Commercial Weigh-in-Motion Vehicle Scale Systems

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 acceptance and 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 shown in Table 6. Maintenance Tolerances.

T.N.3.X.2 Dynamic Weighing. - Acceptance tolerance shall be one-half 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-A249.

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

SCL-19.2 I T.N.3.6. Coupled-In-Motion Railroad Weighing Systems., T.N.4.6. Time Dependence (Creep) for Load Cells during Type Evaluation., UR.5. Coupled-in-Motion Railroad Weighing Systems. and Appendix D – Definitions: point-based railroad weighing systems.

NOTE: This item replaces the 2018 Items, Block 2 items: SCL-1 & SCL-2, and 2017 individual items 3200-4 and 3200-8.

Source:
Meridian Engineers Pty Ltd.

Purpose:
Replace the 2018 Block 2 Items: SCL-1 and SCL-2 with new proposals to:

a) Increase the tolerance for dynamic weighments of unit trains,
b) Provide an exception from "creep" tolerances for point-based in-motion railroad weighing systems,
c) Require the user of coupled-in-motion railroad weighing systems to provide a static scale in close proximity for testing purposes, and
d) Add a definition for Point-Based Railroad Weighing Systems to support those proposals.

Item Under Consideration:
Amend NIST Handbook 44 Scales Code as follows:

UR.5. Coupled-in-Motion Railroad Weighing Systems. –

(a) A coupled-in-motion weighing system placed in service on or after January 1, 1991, should be tested in the manner in which it is operated, with the locomotive either pushing or pulling the cars at the designed speed and in the proper direction. The cars used in the test train should represent the range of gross weights that will be used during the normal operation of the weighing system. Except as provided in N.4.2. Weighing Systems Placed in Service Prior to January 1, 1991 and Used to Weigh Trains of Ten or More Cars and N.4.3.(a) Weighing Systems Placed in Service on or After January 1, 1991, and Used to Weigh Trains of Ten or More Cars, normal operating procedures should be simulated as nearly as practical. Approach conditions for a train length in each direction of the scale site are more critical for a weighing system used for individual car weights than for a unit-train-weights-only facility and should be considered prior to installation.

(b) For coupled-in-motion weighing systems used only for dynamic weighing, the user shall provide an alternate certified scale to be used as a reference scale. The weights and measures authority having jurisdiction over the weighing system shall determine if the reference scale provided is suitable in terms of size, capacity, minimum division, performance requirements, and the proximity to the weighing system under evaluation. The reference weight cars weighed on the

reference scale may then be used for calibration and annual inspection by the jurisdiction with statutory authority for the system.

(Added 1990) (Amended 1992 **and 20XX**)

And add the following definition to NIST Handbook 44 Appendix D – Definitions:

Point-based railroad weighing systems. – An In-Motion-Railroad Weighing System designed to weigh wheel(s) of a railway car when centered on the load sensor within a weighing zone typically of 2 inches or less. The weight of the wheels are added to obtain the total weight of the cars and train which are used for any transaction.

Background/Discussion: See Appendix A, Page S&T-A250.

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

SCL-20.9 S.1.1.3. Zero Indication, Load Receiving Elements Separate from Weighing Elements. and Appendix D – Definitions: no load reference value

Source:
Kansas Department of Agriculture.

Purpose:
Facilitate more accurate net weight determinations for systems utilizing a load-receiving element separate from a weighing element.

Item Under Consideration:
Amend NIST Handbook 44 Scales Code as follows:

S.1.1.3 Zero Indication, Load-Receiving Elements Separate from Weighing Elements. – Provisions 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.
(Nonretroactive as of January 1st, 20XX)

S.1.1.3.1 Weighing Sequence. – For weighing systems used to receive (weigh in), the no-load reference value shall be determined and recorded only at the beginning of each weighing cycle. For systems used to deliver (weigh out), the no-load reference value shall be determined and recorded only after the gross load reference value for each weighing cycle has been indicated and recorded.
(Nonretroactive as of January 1st, 20XX)

S.1.1.3.2 Recording Sequence. – Provision shall be made so that all weight values are indicated until the completion of the recording of the indicated value.
(Nonretroactive as of January 1st, 20XX)

S.1.1.3.3 Zero-Load Adjustment. – The weighing system shall be equipped with manual or semiautomatic means by which the zero-load balance or no-load reference value indication may be adjusted. Automatic zero-tracking and automatic zero-setting mechanisms are prohibited.
(Nonretroactive as of January 1st, 20XX)

And amend Appendix D – Definitions as follows:

no-load reference value. – A positive **or negative** weight value indication with no load in the load-receiving element of a scale. ~~(Used with automatic bulk-weighing systems and certain single-draft, manually-operated receiving hopper scales installed below grade and used to receive grain.)~~ [2.20, 2.22]

Background/Discussion: See Appendix A, Page S&T-A254.

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

SCL-20.10 S.1.2.2.2. Class I and II Scales Used in Direct Sale and S.1.2.2.3. Deviation of a "d" Resolution.

Source:
New York Department of Agriculture and Markets

Purpose:
Remove the specification prohibiting the value of "d" from differing from the value of "e" for class I and II scales.

Item Under Consideration:
Amend NIST Handbook 44 Scales Code as follows:

~~***S.1.2.2.2. Class I and II Scales Used in Direct Sales. When accuracy Class I and II scales are used in direct sale applications the value of the displayed division "d" shall be equal to the value of the verification scale interval "e."***~~
~~***[Nonretroactive as of January 1, 2020; to become retroactive as of January 1, 2023]***~~
~~**(Added 2017)**~~

~~**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. Digital Indication and Representation.**~~
~~**(Added 2018)**~~

S.1.2.2.2. Class III and IIII Scales. The value of "e" is specified by the manufacturer as marked on the device. Except for dynamic monorail scales, "e" must be less than or equal to "d".

Background/Discussion: See Appendix A, Page S&T-A254.

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

SCL-20.11 S.1.2.2.2. Class I and II Scales Used in Direct Sales.

Source:
Mettler Toledo, LLC

Purpose:
Clarify that this specification is not applicable to jewelers' scales and that it does apply to the other markets for which it was intended when modified in 2019, primarily for direct sales of cannabis.

Item Under Consideration:
Amend NIST Handbook 44 Scales Code as follows:

S.1.2.2.2. Class I and II Scales Used in Direct Sales. – ***Except for jewelers' scales, ~~W~~w****hen accuracy Class I and II scales are used in direct sale applications, the value of the displayed division "d" shall be equal to the value of the verification scale interval "e.*

[Nonretroactive as of January 1, 202~~0~~3; ~~to become retroactive as of January 1, 2023~~]

Background/Discussion: See Appendix A, Page S&T-A255.

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

SCL-20.12 Multiple Sections to Add Vehicle Weigh-in-Motion to the Code and Appendix D – Definitions; vehicle scale and weigh-in-motion vehicle scale.

Source:
Mettler Toledo, LLC

Purpose:
Include single draft Weigh-in-Motion scales as a legal for trade commercial Class IIIL device.

Item Under Consideration:
Amend NIST Handbook 44 Scales Code as follows:

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

...

S.1.2.1. Digital Indicating Scales, Units.

S.1.2.1.1. - Value of Other Units of Measure for Weigh-in-Motion Vehicle Scales.
S.1.2.1.1.1. Speed. – Vehicle speeds shall be measured in miles per hour or kilometers per hour.

(Added 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:

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

(b) vehicle speed

(c) vehicle direction

(d) total vehicle weight;

(e) time and date.

(Added 20XX)

…

S.1.14. Weigh-in-Motion Vehicle Scales Operational Limitations.

S.1.14.1. Identification of a Fault. – Fault conditions shall be presented to the operator in a clear and unambiguous means. The following fault conditions as well as others may be identified:

(a) Vehicle speed is below the minimum or above the maximum speed as specified.
(b) Direction of vehicle is not valid for this installation.

(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:

(b) 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**, 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:

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

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

(d) 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:

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

(d) 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 scales, ~~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, **weigh-in-motion 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)

…

S.6. Marking Requirements

Table S.6.3.a.
Marking Requirements

To Be Marked With ⇓	Weighing Equipment				
	Weighing, Load-Receiving, and Indicating Element in Same Housing or Covered on the Same CC[1]	**Indicating Element not Permanently Attached to Weighing and Load-Receiving Element or Covered by a Separate CC**	**Weighing and Load-Receiving Element Not Permanently Attached to Indicating Element or Covered by a Separate CC**	**Load Cell with CC (11)**	**Other Equipment or Device (10)**
Manufacturer's ID (1)	X	X	X	X	X
Model Designation and Prefix (1)	X	X	X	X	X
Serial Number and Prefix (2)	X	X	X	X	X (16)
Certificate of Conformance Number (CC) (23)	X	X	X	X	X (23)
Accuracy Class (17)	X	X (8)	X (19)	X	
Nominal Capacity (3)(18)(20)	X	X	X		
Value of Scale Division, "d" (3)	X	X			
Value of "e" (4)	X	X			
Temperature Limits (5)	X	X	X	X	
Concentrated Load Capacity (CLC) (12)(20)(22)		X	X (9)		
Special Application (13)	X	X	X		
Maximum Number of Scale Divisions (n_{max}) (6)		X (8)	X (19)	X	
Minimum Verification Scale Division (e_{min})			X (19)		
"S" or "M" (7)				X	
Direction of Loading (15)				X	
Minimum Dead Load				X	
Maximum Capacity				X	
Minimum and Maximum Speed (25)		**X**	**X**		
Vehicle Direction Capability (26)		**X**	**X**		
Safe Load Limit				X	
Load Cell Verification Interval (v_{min}) (21)				X	

Table S.6.3.a. Marking Requirements					
Section Capacity and Prefix (14)(20)(22)(24)		X	X		

(Added 1990) (Amended 1992, 1999, 2000, 2001, 2002, 2004 **and 20XX**

Table S.6.3.b. Notes for Table S.6.3.a. Marking Requirements
25. Weigh-in-Motion Vehicle Scales must be marked with minimum and maximum speed limitations. (Added 20XX) **26. Weigh-in-Motion Vehicle Scales must be marked with direction capability (uni-directional, bi-directional). (Added 20XX)**

…

N.6. **Nominal Capacity of Prescription Scales**. – The nominal capacity of a prescription scale shall be assumed to be one-half apothecary ounce, unless otherwise marked. (Applicable only to scales not marked with an accuracy class.)

N.7. Weigh-in-Motion Vehicle Scales Test Procedures.

N.7.1. Selection of Test Vehicles. – All testing associated with the procedures described in each of the subparagraphs of N.7.4. shall be performed with a minimum of two test vehicles.

N.7.1.1. Test vehicles should be representative of the vehicles weighed on the scale typical to the system's daily operation.

N.7.2. Test Loads

N.7.2.1. Reference vehicles. – Test vehicles used for dynamic testing (reference vehicles) shall be weighed empty and also weighed loaded to at least 85% of their legal maximum Gross Vehicle Weight. The "load" shall be non-shifting and shall be positioned to present as close as possible, an equal side-to-side load.

N.7.2.2. Test Loads. – All other test loads shall use certified test weights.

N.7.3. Test Speeds. – Dynamic tests shall be conducted at the minimum operating speed, maximum operating speed, and middle of the operating speed range that are specified for the Weigh-in-Motion vehicle scale.

N.7.4 Dynamic Test Procedures

N.7.4.1. Testing for a Weigh-in Motion-Vehicle Scale shall simulate the normal intended use as closely as possible i.e. test as used.

N.7.4.2. The tests shall be conducted using the reference vehicles defined in N.7.1. Selection of Test Vehicles.

N.7.4.3. The tests shall consist of a minimum of 10 runs for each test vehicle at the speeds as stated in N.7.3. Test Speeds.

N.7.4.4. Tests should include empty and loaded vehicles, certified weights should be used for loaded vehicles.

N.7.4.5. Direction Test. – Dynamic tests will be performed with reference vehicles in both directions, if applicable.

N.7.4.6. Reference vehicles must stay within the defined roadway along the load receiving element. The tests shall be conducted with 6 runs with the vehicle centered along the width of the load receiving element; 2 runs with the vehicle on the right side along the width of the load receiving element; and 2 runs with the vehicle on the left side along the width of the load receiving element.

N.7.4.7 At the conclusion of the dynamic tests there will be a minimum of 10 weight readings for each test vehicle. The tolerance for each weight reading shall be based on the Weigh-in-Motion Scale division and the acceptance tolerance values per Table 6. for Accuracy Class IIIL

(Added 20XX)

…

Table 7a.
Typical Class or Type of Device for Weighing Applications

Class	Weighing Application or Scale Type
I	Precision laboratory weighing
II	Laboratory weighing, precious metals and gem weighing, grain test scales
III	All commercial weighing not otherwise specified, grain test scales, retail precious metals and semi-precious gem weighing, grain-hopper scales, animal scales, postal scales, vehicle on-board weighing systems with a capacity less than or equal to 30 000 lb, and scales used to determine laundry charges
III L	Vehicle scales, weigh-in-motion vehicle scales, vehicle on-board weighing systems with a capacity greater than 30 000 lb, axle-load scales, livestock scales, railway track scales, crane scales, and hopper (other than grain hopper) scales
IIII	Wheel-load weighers and portable axle-load weighers used for highway weight enforcement
Note: A scale with a higher accuracy class than that specified as "typical" may be used.	

(Amended 1985, 1986, 1987, 1988, 1992, 1995, ~~and~~ 2012**, and 20XX)**

…

UR.2.5. Access to Weighing Elements. – Adequate provision shall be made for ready access to the pit of a vehicle, **weigh-in-motion vehicle,** livestock, animal, axle-load, or railway track scale for the purpose of inspection and maintenance. Any of these scales without a pit shall be installed with adequate means for inspection and maintenance of the weighing elements.
(Amended 1985 and 20XX)

UR.2.6. Approaches.

UR.2.6.1. Vehicle Scales and Weigh-in-Motion Vehicle Scales. – On the entrance and exit end(s) of a vehicle scale **and weigh-in-motion 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**, and 20XX**)

…

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 and Weigh-in-Motion Vehicle Scales. – A vehicle scale **and weigh-in-motion 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) **(Amended 20XX)**

…

UR.3.3. Single-Draft Vehicle Weighing. A vehicle or a coupled-vehicle combination shall be commercially weighed on a vehicle scale **or a weigh-in-motion 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 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:

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

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

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

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

(e) livestock**,** ~~and~~ vehicle ~~scales~~**, and weigh-in-motion vehicle scales** generate weight tickets to correct erroneous tickets.

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

…

Appendix D. Definitions

…

vehicle scale. – A scale adapted to weighing highway, farm, or other large industrial vehicles (except railroad freight cars), loaded or unloaded. [2.20]

…

weigh-in-motion vehicle scale. – A scale adapted to weighing highway, farm, or other large industrial vehicles (except railroad freight cars), loaded or unloaded**, in a single draft while these vehicles move continuously across the scale.** [2.20]

(Amended and 20XX)

Background/Discussion: See Appendix A, Page S&T-A257.

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

SCL-20.13 N.1.5. Discrimination Test.

Source:
NTEP Weighing Sector

Purpose:
Provide and exception to the discrimination test requirements for scales in which the value of e = d and is less than 5 mg e since this is not a practical test for field inspection.

Item Under Consideration:

Amend NIST Handbook 44 Scales Code as follows:

N.1.5. Discrimination Test. – ***Except for digital electronic scales designated Accuracy Class I or II in which the value of e = d and is less than 5 mg, A a*** *discrimination test shall be conducted on all automatic indicating scales with the weighing device in equilibrium at or near zero load and at or near maximum test load, and under controlled conditions in which environmental factors are reduced to the extent that they will not affect the results obtained. For scales equipped with an Automatic Zero-Tracking Mechanism (AZT), the discrimination test may be conducted at a range outside of the AZT range.*
[Nonretroactive as of January 1, 1986]
(Added 1985) (Amended 2004 **and 20XX**)

Background/Discussion: See Appendix A, Page S&T-A258.

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

ABW – AUTOMATIC BULK WEIGHING SYSTEMS

ABW-16.1 D A. Application, S Specifications, N. Notes, UR. User Requirements and Appendix D – Definitions: automatic bulk weighing system.

Source:
Kansas

Purpose:
Modernize the ABWS Code to more fully reflect the types of systems in use and technology available while still maintaining the safeguards of the current code and amend the ABWS definition by removing requirements that are included in specifications and providing guidance as to what amount of automation is required for an Automatic Bulk Weighing System.

Item Under Consideration:
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**)

And amend Handbook 44 Appendix D – Definitions as follows:

automatic bulk weighing system. – A weighing system **capable of ~~adapted to the automatic~~ automatically** weighing **~~of bulk commodities 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.~~** [2.22]

Background/Discussion: See Appendix A, Page S&T-A259.

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

WIM – WEIGH-IN-MOTION SYSTEMS USED FOR VEHICLE ENFORCEMENT SCREENING TENTATIVE CODE

WIM-19.11 D Title of Tentative Code, S.1.7.1. Values to be Recorded., S.4.1. Designation of Accuracy., N.1. Test Procedures, T.2. Tolerance Values for Accuracy ~~Class A~~ Classes., UR.1.1. General, Table 1. Typical Class or Type of Device for Weighing Applications.

Source:
Intercomp Company

Purpose:
Provide for certification of non-legal for trade weigh-in-motion scales for vehicles.

Item Under Consideration:
Amend NIST Handbook 44 Weigh-in-Motion Systems used for Vehicle Enforcement Screening Code as follows:

Section 2.25. Weigh-In-Motion Systems

Used for Vehicle ~~Enforcement~~ Weight Screening – Tentative Code

...

S.1.7.1. Values to be Recorded. – At a minimum, the following values shall be printed and/or stored electronically for each vehicle weighment:

...

(j) violations **if applicable,** as identified in paragraph S.2.1. Violation Parameters, which occurred during the weighing of the vehicle; and

...

S.2.1. Violation Parameters (if applicable,). – The instrument shall be capable of accepting user-entered violation parameters

...

S.4.1. Designation of Accuracy. – Weigh-in-motion systems meeting the requirements **in table T.2.2** of this code shall be designated **with appropriate accuracy class. ~~as accuracy Class A.~~**

...

N.1. Test Procedures

...

N.1.4. Test Speeds. – All dynamic tests shall be conducted **up to the intended speed limit of the WIM system or** within 20 % below or at the posted speed limit**, whichever is lower.**

N.1.5. Test Procedures.

N.1.5.1. Dynamic Load Test. – The dynamic test shall be conducted using the test vehicles defined in N.1.1. Selection of Test Vehicles. The test shall consist of a minimum of 20 runs for each test vehicle at the speed as stated in N.1.4. Test Speeds.

At the conclusion of the dynamic test there will be a minimum of 20 weight readings for each single axle, axle group, and gross vehicle weight of the test vehicle. The tolerance for each weight reading shall be based on the percentage values specified in Table T.2.2. ~~**Tolerances for Accuracy Class A.**~~

...

T.2. Tolerance Values for Accuracy Classes ~~Class A.~~

T.2.2. Tolerance Values for Dynamic Load Test. – The tolerance values applicable during dynamic load testing are as specified in Table T.2.2.

~~**Table T.2.2. Tolerances for Accuracy Class A**~~

~~**Load Description***~~	~~**Tolerance as a Percentage of Applied Test Load**~~
~~Axle Load~~	~~± 20 %~~
~~Axle Group Load~~	~~± 15 %~~
~~Gross Vehicle Weight~~	~~± 10 %~~
~~* No more than 5 % of the weighments in each of the load description subgroups shown in this table shall exceed the applicable tolerance.~~	

Table T.2.2. Tolerances for Accuracy Classes

	Tolerance as a Percentage of Applied Test Load			
Load Description*	**D**	**C**	**B**	**A**
Axle Load	**± 5 %**	**± 10 %**	**± 15 %**	**± 20 %**
Axle Group Load	**± 3 %**	**± 7 %**	**± 10 %**	**± 15 %**
Gross Vehicle Weight	**± 1 %**	**± 2 %**	**± 5 %**	**± 10 %**
*** No more than 5 % of the weighments in each of the load description subgroups shown in this table shall exceed the applicable tolerance**				

...

UR.1.1. General. – The typical class or type of device for particular weighing applications is shown in Table 1. Typical Class or Type of Device for Weighing Applications.

Table 1.
Typical Class or Type of Device for Weighing Applications

Class	**Weighing Application**
A	Screening and sorting of vehicles based on axle, axle group, and gross vehicle weight.
B	**Industrial Screening, GVW axle, and axle group checkweighing**
C	**TBD**
D	**TBD**

Note: A WIM system with a higher accuracy class than that specified as "typical" may be used.

Background/Discussion: See Appendix A, Page S&T-A263.

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

BLOCK 1 ITEMS (B1) TERMINOLOGY FOR TESTING STANDARDS (VERIFICATION STANDARDS, FIELD STANDARDS, TRANSFER STANDARDS, FIELD REFERENCE STANDARDS, ETC.,) TOLERANCES ON TESTS WHEN TRANSFER STANDARDS ARE USED, MINIMUM QUANTITY FOR FIELD REFERENCE STANDARD METER TESTS

NOTE: During the 2019 NCWM S&T Committee Meeting, the S&T Committee considered the comments during the opening hearing and recommended that B1, B2, LPG-3 and MFM-5 agenda items be combined with GEN-3 and gave these items an assign status. This block of items ("New" BLOCK 1) now includes previously numbered items: GEN-3; Block 1; Block 2; LPG-3; and MFM-5. The Item Under Consideration for all individual items has been included in the listing that follows.

Source:
NIST OWM, Endress + Hauser Flowtec AG USA (2018), and Seraphin Test Measure Company (2019)

Purpose:

(a) Add a definition for field standard that identifies the critical characteristics for field standards to comply with the Fundamental Considerations of Handbook 44; and

(b) To add a generalized definition for transfer standards in Handbook 44 to clearly include the transfer standards already referenced in various codes; and

(c) To specify that when a transfer standard is used, the basic tolerances specified in Handbook 44 be increased by the amount of the estimated uncertainty associated with the transfer standard

(d) 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.

B1: GEN-19.1 A G-T.5. Tolerances on Tests When Transfer Standards are Used., Appendix D – Definitions: <u>standards, field.</u>, ~~transfer standard.~~ and <u>standard, transfer.</u>

Source:
Seraphin Test Measure Company

Purpose:

(e) Add a definition for field standard that identifies the critical characteristics for field standards to comply with the Fundamental Considerations of Handbook 44 (specifically, a standard that has long-term stability and

meets the one-third requirement for accuracy and uncertainty over the range of environmental and operational variables in which commercial measuring devices are used); and

(f) To add a generalized definition for transfer standards in Handbook 44 to clearly include the transfer standards already referenced in various codes; and

(g) To specify that when a transfer standard is used, the basic tolerances specified in Handbook 44 be increased the amount of the estimated uncertainty associated with the transfer standard.

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

G-T.5. Tolerances on Tests When Transfer Standards Are Used. – 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.

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

And amend Handbook 44 Appendix D – Definitions as follows:

Standard, Field. – A physical standard that (a) is stable (accurate and repeatable) over an extended period of time (typically one year) and (b) meets the specifications and tolerances in NIST Handbook 105- series standards (or other suitable and designated standards) over the range of environmental and operational parameters in which the commercial measuring devices are used 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. "Other suitable and designated standards" must show that the field standards have been tested over the range of environmental and operational parameters in which the commercial measuring devices under test are used and prove that the performance of the field standard meets the requirements of the fundamental considerations.

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

Standard, Transfer.- A physical artifact, static or dynamic measurement device or a reference material that is stable (accurate and repeatable) for a short time period under the limited environmental and operational conditions during which the transfer standard is used. A transfer standard may be used as a temporary measurement reference to check the accuracy of a commercial measuring instrument, but the transfer standard does not satisfy the NIST Handbook 44 Fundamental Consideration that its correction and uncertainty are less than one-third of the smallest tolerance applied to the commercial measuring instrument under test, either over a long time period or a wide range of environmental or operating parameters. Transfer standards are called by different terms in different Handbook 44 codes and include terms such as master meter, fifth wheel, material, reference weight [railroad] cars, test vehicles and reference vehicle.

BLOCK 1 ITEMS (B1) A TERMINOLOGY FOR TESTING STANDARDS
(original B1 items)

Source:
NIST OWM

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.

B1: SCL-18.1 A 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**)

B1: ABW-18.1 A 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**~~standard 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)

B1: AWS-18.1 A 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)

B1: CLM-18.1 A 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)**~~

B1: CDL-18.1 A 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.**~~

B1: HGM-18.1 A 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.**~~

B1: GMM-18.1 A 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)

B1: LVS-18.1 A 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)

B1: OTH-18.1 A 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)

B1: OTH-18.2 A 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)

BLOCK 1 ITEMS (B1) A DEFINE "FIELD REFERENCE STANDARD"
(original block 2 items)

Source:
Endress + Hauser Flowtec AG USA

B1: CLM-18.2 A 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 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 **meter** when compared to a basic reference standard. (Added 1976)

B1: CDL-18.2 A 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**.

B1: HGM-18.2 A 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.

B1: OTH-18.3 A 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.**~~

B1: LPG-15.1 A N.3. Test Drafts.

Source:
Endress + Hauser Flowtec AG USA

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)

B1: MFM-15.1 A N.3. Test Drafts.

Source:
Endress + Hauser Flowtec AG USA

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-A265.

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

LMD – LIQUID MEASURING DEVICES

LMD-19.1 I UR.4.2. Security for Retail Motor-Fuel Devices.

Note: This replaces Item GEN-1: G-A1 Commercial and Law-Enforcement Equipment. and G-S.2. Facilitation of Fraud.

Source:
Arizona, Florida, Maine, Michigan and Cambridge, Massachusetts; Skimmer Task Group

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 Liquid Measuring Device Code as follows:

UR.4.2. Security for Retail Motor-Fuel Devices (RMFD). Any retail motor fuel device capable of conducting customer initiated electronic financial transactions must be secured to substantially restrict the ability of unauthorized persons to manipulate it to obtain payment information that could be used to commit fraud. The following is a non-exhaustive list of ways that restriction of such manipulation may be accomplished:

(a) A physical lock, locking device, or a physical securing device that will restrict access to the electronic financial transaction compartment of the RMFD. A lock, locking device or securing device shall not be manipulated with commonly available tools. A lock shall not allow the use of a universal key. A universal key is a key that is readily available in the market or can be easily purchased in a hardware or common retail store. A single non-universal key for all of the like devices at a retail facility or for all of the like devices at a chain of retail facilities is acceptable or;

(b) Electronic alarming or disabling of the equipment if unauthorized access is attempted or;

(c) Advanced payment acceptance technologies that increase protections against the theft of payment information itself or do not allow access to such information in a form that may be used to commit fraud or;

(d) Another security solution that has been approved by the local or state weights and measures jurisdiction with authority.

(Added, 20XX)

Background/Discussion: See Appendix A, Page S&T-A267.

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

LMD-20.1 Table S.2.2. Categories of Device and Methods of Sealing.

Source:
Wayne Fueling Systems, LLC

Purpose:
Allow for an electronic log in lieu of a printed copy for a category 3 seal on an LMD.

Item Under Consideration:
Amend NIST Handbook 44 Liquid Measuring Device Code as follows:

Table S.2.2. ***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.* *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.]** *[*Nonretroactive as of January 1, 1996]*
Category 3: *Remote configuration capability access may be unlimited or controlled through a software switch (e.g., password).* *[Nonretroactive as of January 1, 1995]* *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.* *[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 information must be available on demand through the device or through another on-site device either in printed or electronic format.*** *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.)*

[Nonretroactive as of January 1, 1995]

(Table Added 1993) (Amended 1995, 1998, 1999, 2006, and 2015)

Background/Discussion: See Appendix A, Page S&T-A269.

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

LMD-20.2 S.1.6.10. Automatic Timeout – Pay-at-pump Retail Motor-Fuel Devices.

Source:
7-Eleven, Inc.

Purpose:
Allow additional time to automatic timeout on retail motor fuel dispensers, as conditions may warrant.

Item Under Consideration:
Amend NIST Handbook 44 Liquid Measuring Device Code as follows:

S.1.6.10. Automatic Timeout – Pay-At-Pump Retail Motor-Fuel Devices. *– Once a device has been authorized, it must de-authorize within* ***~~two minutes~~ 180 seconds (or five minutes where conditions warrant)*** *if not activated. Re-authorization of the device must be performed before any product can be dispensed. If the time limit to de-authorize the device is programmable, it shall not accept an entry greater than* ***~~two minutes~~ 180 seconds (or five minutes where conditions warrant)****.*

[Nonretroactive as of January 1, 2017]

(Added 2016)

Background/Discussion: See Appendix A, Page S&T-A270.

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

LMD-20.3 UR.1.1. Discharge Hose.

Source:
Connecticut

Purpose:
To prevent the inadvertent selection of a grade of motor fuel.

Item Under Consideration:
Amend NIST Handbook 44 Liquid Measuring Device Code as follows:

UR.1.1. Discharge Hose.

UR.1.1.1. Length. – The length of the discharge hose on a retail motor-fuel device:

(a) shall be measured from its housing or outlet of the discharge line to the inlet of the discharge nozzle;

(b) shall be measured with the hose fully extended if it is coiled or otherwise retained or connected inside a housing; ~~**and**~~

(c) shall not exceed 5.5 m (18 ft) unless it can be demonstrated that a longer hose is essential to permit deliveries to be made to receiving vehicles or vessels~~.~~**; and**

(d) shall be so situated and located to prevent the inadvertent selection of a fuel grade.

An unnecessarily remote location of a device shall not be accepted as justification for an abnormally long hose.

(Amended 1972 ~~**and**~~ 1987**, and 20XX**)

Background/Discussion: See Appendix A, Page S&T-A271.

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

VTM – VEHICLE TANK METERS

VTM-18.1 S.3.1.1. Means for Clearing the Discharge Hose and UR.2.6. Clearing the Discharge Hose.

Source:
New York and NIST OWM (Carryover from 2018, VTM 1-B)

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.

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

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

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

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

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

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

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

(f) clear means, such as an indicator light or audible alarm, is used to identify when the valve is in *use* ***on both quantity indications and any associated recorded representations (e.g., using such terms as "flushing mode" or "not for commercial use");***
[nonretroactive as of January 1, 2022 to become retroactive January 1, 2025]

(g) ***effective, automatic means shall be provided to prevent passage of liquid through any such flush system during normal operation of the measuring system; and***
[nonretroactive as of January 1, 2022 to become retroactive January 1, 2025]

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

(Added 2018)**(Amended 2019)**

UR.2.6. Clearing the Discharge Hose

UR.2.6.1. Clearing the Discharge Hose, General. – A manifold flush or similar system designed to assist in flushing product between deliveries is not to be used or operational during a commercial transaction. The inlet valves for the system are not to be connected to any hose or piping (dust covers are permitted) when not in use. When the flushing system is in operation, the discharge hose is only to be connected to the port for the product type being flushed from the discharge line. Following the flushing process, indications and recording elements must be reset to zero prior to beginning a commercial delivery.

(Added 20XX)

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

Background/Discussion: See Appendix A, Page S&T-A273.

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

VTM-20.1 S.3.1. Diversion of Measured Liquid.

Source:
Murray Equipment, Inc., Total Control Systems

Purpose:
Clarify the paragraph to protect vehicle motor fuel quality, retain safe operating procedures when handling vehicle motor fuels, and to prevent fraud during delivery of vehicle motor fuels from vehicle tank meters.

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

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

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

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

This paragraph does not apply to the following:

(1) Equipment used exclusively for fueling aircraft.

(2) Multiple-product, single-discharge hose metering systems ***that carry non-Vehicle Motor Fuels (ie. Heating oil)*** that are equipped with systems designed to flush the discharge hose, provided the flushing system complies with the provisions of paragraph S.3.1.1. Means for Clearing the Discharge Hose. (Amended 2018)

S.3.1.1. Means for Clearing the Discharge Hose. – Metering systems ***that carry non-Vehicle Motor Fuels (ie. Heating oil)*** may be equipped with systems specifically designed to facilitate clearing of the discharge hose prior to delivery to avoid product contamination. In such systems, a valve to temporarily divert product from the measuring chamber of the meter to a storage tank shall be installed only if all the following are met:

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

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

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

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

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

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

(g) no hoses or piping are connected to the inlet when it is not in use. (Added 2018)

Background/Discussion: See Appendix A, Page S&T-A276.

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

VTM-20.2 Table T.2. Tolerances for Vehicle Mounted Milk Meters.

Source:
Poul Tarp AS

Purpose:
Change tolerances to accommodate more efficient milk-metering systems.

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

Table 2.
Tolerances for Vehicle-Mounted Milk Meters

Indication (gallons)	Maintenance Tolerance (gallons)	Acceptance Tolerance (gallons)
100	~~**0.5**~~ **0.6**	~~**0.3**~~ **0.5**
200	~~**0.7**~~ **1.2**	~~**0.4**~~ **1.0**
300	~~**0.9**~~ **1.8**	~~**0.5**~~ **1.5**
400	~~**1.1**~~ **2.4**	~~**0.6**~~ **2.0**
500	~~**1.3**~~ **3.0**	~~**0.7**~~ **2.5**
Over 500	Add ~~**0.002**~~ **0.006** gallons per indicated gallon over 500	Add ~~**0.001**~~ **0.005** gallons per indicated gallon over 500

Background/Discussion: See Appendix A, Page S&T-A281.

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

LPG – LPG AND ANHYDROUS AMMONIA LIQUID-MEASURING DEVICES

LPG-20.1 S.2.5. Zero-Set-Back Interlock and S.2.6. Automatic Timeout.

Source:
NIST OWM

Purpose:
Reformat the requirements for zero-set-back interlock and time-out features for clarity and consistency in the LPG code to align the format with other measuring devices codes

Item Under Consideration:
Amend NIST Handbook 44 Liquid Petroleum Gas and Anhydrous Ammonia Liquid-Measuring Devices Code as follows:

S.2.5. Zero-Set-Back Interlock.

S.2.5.1. Zero-Set-Back Interlock, Stationary (Other than Stationary Retail Motor-Fuel Dispensers) and Vehicle-Mounted Meters, Electronic. *- A device shall be so constructed* ***so*** *that after an individual delivery or multiple deliveries at one location have been completed, an automatic interlock system shall engage to prevent a subsequent delivery until the indicating element and, if equipped, recording element have been returned to their zero position.* ~~***For individual deliveries, if there is no product flow for two minutes the transaction must be completed before additional product flow is allowed. The 2-minute timeout shall be a sealable feature on an indicator.***~~
[Nonretroactive as of 2021]
*(Added 2019)****(Renumbered and Amended 2020)***

S.2.6*5.2****. Zero-Set-Back Interlock for Stationary Retail Motor-Fuel Devices. –*** *A device shall be constructed so that:*

(a) after a delivery cycle has been completed by moving the starting lever to any position that shuts off the device, an automatic interlock prevents a subsequent delivery until the indicating elements and recording elements, if the device is equipped and activated to record, have been returned to their zero positions;

(b) the discharge nozzle cannot be returned to its designed hanging position (that is, any position where the tip of the nozzle is placed in its designed receptacle and the lock can be inserted) until the starting lever is in its designed shut-off position and the zero-set-back interlock has been engaged; and

(c) in a system with more than one dispenser supplied by a single pump, an effective automatic control valve in each dispenser prevents product from being delivered until the indicating elements on that dispenser are in a correct zero position.

[Nonretroactive as of January 1, 2017]
(Added 2016) ***(Renumbered 2020)***

S.2.6. Automatic Timeout.

S.2.6.1. Stationary (Other than Stationary Retail Motor-Fuel Dispensers) and Vehicle-Mounted Meters, Electronic. 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.
[Nonretroactive as of 2021]

(Added 2020)

S.2.6.2. Automatic Timeout Pay-at-Pump Retail Motor-Fuel Devices. – Once a device has been authorized, it must de-authorize within two minutes if not activated. Re-authorization of the device must be performed before any product can be dispensed. If the time limit to de-authorize the device is programmable, it shall not accept an entry greater than two minutes. [Nonretroactive as of 2021]

(Added 2020)

Background/Discussion: See Appendix A, Page S&T-A280.

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

WTR – WATER METERS

WTR-20.1 S.3.2. Meter size and Directional Flow Marking Information.

Source:
California Department of Food and Agriculture, Division of Measurement Standards

Purpose:
Add marking requirements for meter size and water flow direction indication marking requirements.

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

S.3.2. Meter Size and Directional Flow Marking Information. A water meter shall be clearly and indelibly marked with the following information:

(a) meter size on the indicator face plate; and

(b) water flow direction designated by an arrow cast or stamped into the body of the meter.

Background/Discussion: See Appendix A, Page S&T-A281.

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

WTR-20.2 S.1.1.4. Advancement of Indicating and Recording Elements.

Source:
County of San Diego Department of Agriculture

Purpose:
Clarify S.1.1.4. Advancement of Indicating and Recording Elements shall also be applicable to non-mechanical water meters.

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

S.1.1.4. Advancement of Indicating and Recording Elements. – Primary indicating and recording elements shall be susceptible to advancement only by the ~~mechanical~~ **normal** operation of the device.

Background/Discussion: See Appendix A, Page S&T-A281.

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

MFM – MASS FLOW METERS

MFM-20.1 S.1.3.3. Maximum Value of Quantity Divisions.

Source:
NIST OWM

Purpose:
Reformat to more clearly specify the maximum permissible quantity value for "d" for liquids, Compressed Natural Gas (CNG) and Liquefied Natural Gas (LNG) applications.

Item Under Consideration:
Amend NIST Handbook 44 Mass Flow Meters Code follows:

S.1.3.3. Maximum Value of Quantity-Value Divisions.

The maximum value of the quantity-value division shall not exceed the following.

(a) For compressed natural gas dispensed as an engine fuel:

(1) 0.001 for gasoline gallon equivalent (GGE) units; or

(2) 0.001 diesel gallon equivalent (DGE) units; or

(3) 0.001 kg or 0.001 lb for mass units.

(b) For all gases other than compressed natural gas dispensed as an engine fuel a maximum value not greater than 0.2 % of the minimum measured quantity.
(Added 2020)

(~~b~~**c**) For liquefied natural gas dispensed as an engine fuel:

(1) 0.001 for diesel gallon equivalent (DGE) units; or

(2) 0.001 kg or 0.001 lb for mass units.

(Added 2019)

(~~c~~**d**)For all liquids other than liquefied natural gas dispensed as an engine fuel a maximum value not greater than 0.2 % of the minimum measured quantity**.**

(Amended 1994**,** ~~**and**~~ **2019, and 2020**)

Background/Discussion: See Appendix A, Page S&T-A282.

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

EVF – ELECTRIC VEHICLE FUELING SYSTEMS

EVF-19.1 D S.3.5. Temperature Range for System Components. and S.5.2. EVSE Identification and Marking Requirements.

Source:
NIST OWM

Purpose:
Ensure there are no inconsistencies in the tentative code between the temperature range requirement of – 40 °C to + 85 °C (− 40 °F to 185 °F) specified for the EVSE's operation and the requirement in paragraph S.5.2. EVSE Identification and Marking Requirements that specifies an EVSE must be marked with its temperature limits when they are narrower than and within – 20 °C to + 50 °C (− 4 °F to 122 °F).

Item Under Consideration:
Amend NIST Handbook 44, Electric Vehicle Fueling Systems (EVFS) – Tentative Code as follows:

S.5.2. EVSE Identification and Marking Requirements. – In addition to all the marking requirements of Section 1.10. General Code, paragraph G-S.1. Identification, each EVSE shall have the following information conspicuously, legibly, and indelibly marked:

(a) voltage rating;

(b) maximum current deliverable;

(c) type of current (AC or DC or, if capable of both, both shall be listed);

(d) minimum measured quantity (MMQ); and

(e) temperature limits, if narrower than and within ~~**– 20 °C to + 50 °C (– 4 °F to 122 °F)**~~ **– 40 °C to + 85 °C (– 40 °F to 185 °F)**.

Background/Discussion: See Appendix A, Page S&T-A283.

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

EVF-20.1 S.1.3.2. EVSE Value of the Smallest Unit.

Source:
NIST OWM

Purpose:
Specify the maximum permissible value of the indicated and/or recorded electrical energy unit by an EVSE. Establish a value for the energy unit of measurement (kilowatt-hour) that is: suitable for all commercial transactions and does not significantly lengthen the time (by a factor of 25) to conduct a test of an EVSE.

Item Under Consideration:
Amend NIST Handbook 44, Electric Vehicle Fueling Systems follows:

S.1.3. EVSE Units.

S.1.3.2. EVSE Value of Smallest Unit. – The value of the smallest unit of indicated delivery by an EVSE, and recorded delivery if the EVSE is equipped to record, shall **not** be **greater than** ~~**0.005 MJ or 0.001**~~ **0.0005 MJ or 0.0001 kWh.** **(Amended 2020)**

Background/Discussion: See Appendix A, Page S&T-A285.

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

TXI – TAXIMETERS

See Block 3 Items: Tolerances for Distance Testing.

TIM – TIMING DEVICES CODE

TIM-20.1 S.1.1.3. Value of Smallest Unit.

Source:
NIST OWM

Purpose:
Establish a suitable limit for the maximum value of the quantity division for indicated and recorded time-based or related services delivered through electric vehicle fueling systems.

Item Under Consideration:
Amend NIST Handbook 44, Electric Vehicle Fueling Systems follows:

S.1.1.3. Value of Smallest Unit. – The value of the smallest unit of indicated time and recorded time, if the device is equipped to record, shall not exceed the ~~**equivalent of**~~**following**:

(a) **For parking meters:**

(1) one-half hour on parking meters indicating time in excess of two hours~~**;**~~**, or**

(2)~~**(b)**~~ six minutes on parking meters indicating time in excess of one but not greater than two hours; ~~**or**~~

(b) **For an EVSE equipped with integral time-based feature:**

(1) one minute on an EVSE indicating time not greater than or equal to 60 minutes, or

(2) hours and minutes on an EVSE indicating time intervals in excess of 60 minutes;

(c) **For all other devices** five minutes ~~**on all other devices**~~, except those equipped with an in-service light.

(Amended 1975 **and 2020**)

Background/Discussion: See Appendix A, Page S&T-A286.

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

GMA – GRAIN MOISTURE METERS 5.56 (A)

GMA-19.1 D Table T.2.1. Acceptance and Maintenance Tolerances Air Oven Method for All Grains and Oil Seeds.

Source:
NTEP Grain Analyzer Sector

Purpose:
Reduce the tolerances for the air oven reference method.

Item Under Consideration:
Amend NIST Handbook 44 Grain Moister Meter Code 5.56 (a) as follows:

T.2.1. Air Oven Reference Method. – Maintenance and acceptance tolerances shall be as shown in Table T.2.1. Acceptance and Maintenance Tolerances Air Oven Reference Method. Tolerances are expressed as a fraction of the percent moisture content of the official grain sample, together with a minimum tolerance. (Amended 2001)

~~Table T.2.1. Acceptance and Maintenance Tolerances Air Oven Reference Method~~		
~~Type of Grain, Class, or Seed~~	~~Tolerance~~	~~Minimum Tolerance~~
~~Corn, oats, rice, sorghum, sunflower~~	~~0.05 of the percent moisture content~~	~~0.8 % in moisture content~~
~~All other cereal grains and oil seeds~~	~~0.04 of the percent moisture content~~	~~0.7 % in moisture content~~

Table T.2.1. Acceptance and Maintenance Tolerances Air Oven Reference Method for All Grains and Oil Seeds	
Tolerance	Minimum Tolerance
0.03 of the percent moisture content	0.5 % in moisture content

(Amended 2001 **and 20XX**)

Background/Discussion: See Appendix A, Page S&T-A288.

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

GMA-20.1 S.2.5. Provisions for Sealing.

Source:
NTEP Grain Analyzer Sector

Purpose:
Correct an error caused by a 2019 amendment that inadvertently removed applicability of the provisions in Table S.2.5.1. for any devices manufactured prior to 2020.

Item Under Consideration:
Amend NIST Handbook 44 Grain Moister Meter Code 5.56 (a) 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:

~~Provision shall be made for applying a~~ **An approved means of** security **shall be provided** ~~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 **paragraphs** S.2.5.**1** Sealing **Requirements for Devices Manufactured Between January 1, 1999 and January 1, 2020** ~~Categories of Device and Methods of~~ **and S.2.5.2 Sealing Requirements for Devices Manufactured on or after January1, 2020** ~~)~~before any change that affects the metrological integrity of the device can be made to any mechanism.

(Amended 2019, **2020**)

S.2.5.1. Sealing Requirements for Devices Manufactured Between January 1, 1999 and January 1, 2020. - The appropriate sealing requirements in Table S.2.5.1. shall apply.

Table S.2.5.1.

Categories of Device and Methods of Sealing

For Devices Manufactured Between January 1, 1999 and January 1, 2020

Categories of Device	*Methods of Sealing*
Category 1[1]: *No remote configuration capability.*	*Seal by physical seal or two event counters: one for calibration parameters (000 to 999) and one for configuration parameters (000 to 999). If equipped with event counters, the device must be capable of displaying, or printing through the device or through another on-site device, the contents of the counters.*

Table S.2.5.1.

Categories of Device and Methods of Sealing

For Devices Manufactured Between January 1, 1999 and January 1, 2020

Categories of Device	*Methods of Sealing*
Category 2[1]: *Remote configuration capability, but access is controlled by physical hardware.* *A device shall clearly indicate that it is in the remote configuration mode and shall not be capable of operating in the measure mode while enabled for remote configuration.*	*The hardware enabling access for remote communication must be at the device and sealed using a physical seal or two event counters: one for calibration parameters (000 to 999) and one for configuration parameters (000 to 999). If equipped with event counters, the device must be capable of displaying, or printing through the device or through another on-site device, the contents of the counters.*
Category 3[2]: ***Remote*** ~~C~~***c****onfiguration capability access may be unlimited or controlled through a software switch (e.g., password).* *When accessed for the purpose of modifying sealable parameters, the device shall clearly indicate that it is in the configuration mode and shall not be capable of operating in the measuring mode.*	*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 (for calibration changes consisting of multiple constants, the calibration version number may be used rather than the calibration constants). A printed copy of the information must be available through the device or through another on-site device. The event logger shall have a capacity to retain records equal to 25 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.)*
Category 3a: No remote capability, but operator is able to make changes that affect the metrological integrity of the device (e.g., slope, bias, etc.) in normal operation. ****When accessed for the purpose of modifying sealable parameters, the device shall clearly indicate that it is in the configuration mode and shall not be capable of operating in the measuring mode.***	***Same as Category 3***

Table S.2.5.1. *Categories of Device and Methods of Sealing* **For Devices Manufactured Between January 1, 1999 and January 1, 2020**	
Categories of Device	***Methods of Sealing***
Category 3b: No remote capability, but access to metrological parameters is controlled through a software switch (e.g., password). ****When accessed for the purpose of modifying sealable parameters, the device shall clearly indicate that it is in the configuration mode and shall not be capable of operating in the measuring mode.***	***Same as Category 3***
~~[1] Not allowed for devices manufactured on or after January 1, 2020~~ ~~[2] Required for all devices manufactured on or after January 1, 2020~~	

*[Nonretroactive as of January 1, ~~2020~~ **1999**]*
*[*Nonretroactive as of January 1, 2014]*
(Amended 1998, 2013, ~~and~~ 2019, **2020**)

Note: Zero-setting and test point adjustments are considered to affect metrological characteristics and must be sealed.

(Added 1993) (Amended 1995 and 1997)

S.2.5.2. Sealing Requirements for Devices Manufactured on or after January 1, 2020. - 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 (for calibration changes consisting of multiple constants, the calibration version number may be used rather than the calibration constants.)

A printed copy of the information must be available through the device or through another on-site device. The event logger shall have a capacity to retain records equal to 25 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.)

Background/Discussion: See Appendix A, Page S&T-A289.

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

MDM – MULTIPLE DIMENSION MEASURING DEVICES

MDM-20.1 S.1.3. Negative Values, S.1.6. Customer Indications and Recorded Representations, S.1.7. Minimum Measurement, S.1.8. Indications Below Minimum and Above Maximum, S.2. Design of Zero ~~Tare~~Dimensional Offset and Appendix D – Definitions: dimensional offset

Source:
Multiple Dimension Measuring Device Work Group

Purpose:
Better define and document current practices related to the removal of a conveyance method (skid, pallet, etc) from the final measurement.

Item Under Consideration:
Amend NIST Handbook 44 Multiple Dimension Measuring Devices Code as follows:

S.1.3. Negative Values. – ~~Except when in the tare mode, n~~Negative values shall not be indicated or recorded. **(Amended 20xx)**

S.1.6. Customer Indications and Recorded Representations.
…

Table S.1.6. Required Information to be Provided by Multiple Dimension Measuring Systems			
	Column I[1]	**Column II[1]**	**Column III**

Table S.1.6.
Required Information to be Provided by Multiple Dimension Measuring Systems

Information	**Provided by device**	**Provided by invoice or other means**		**Provided by invoice or other means as specified in contractual agreement**
		Customer present	**Customer not present**	
1. Device identification[2]	D or P	P	P	P or A
2. Error message (when applicable)	D or P	P	N/A	N/A
3. Hexahedron dimensions[3]	D or P	P	P	P or A
4. Hexahedron volume (if used)[3]	D or P	P	P	P or A
5. Actual weight (if used)[3]	D or P	P	P	P or A
6. ~~Tare~~**Dimensional Offset** (if used)[3]	D or P	N/A	N/A	N/A
7. Hexahedron measurement statement[4]	D or P or M	P	P	P or G

A = AVAILABLE UPON REQUEST BY CUSTOMER[5]
D = DISPLAYED
G = PUBLISHED GUIDELINES OR CONTRACTS
M = MARKED
N/A = NOT APPLICABLE
P = PRINTED or RECORDED IN A MEMORY DEVICE and AVAILABLE UPON REQUEST BY CUSTOMER[5]

Notes:

[1] As a minimum all devices or systems must be able to meet either column I or column II.

[2] This is only required in systems where more than one device or measuring element is being used.

[3] Some devices or systems may not utilize all of these values; however, as a minimum either hexahedron dimensions or hexahedron volume must be displayed or printed.

[4] This is an explanation that the dimensions and/or volume shown are those of the smallest hexahedron in which the object that was measured may be enclosed rather than those of the object itself.

[5] The information "available upon request by customer" shall be retained by the party having issued the invoice for at least 30 calendar days after the date of invoicing.

(Amended 2004 **and 20xx**)

S.1.7. Minimum Measurement. – Except for entries of ~~tare~~**dimensional offset**, the minimum measurement by a device is 12 d. The manufacturer may specify a longer minimum measurement. For multi-interval devices, this applies only to the first measuring range (or segment) of each measurement axis (length, width, and height).

(Amended 2017 and 20XX)

S.1.8. Indications Below Minimum and Above Maximum. – When objects are smaller than the minimum dimensions identified in paragraph S.1.7. Minimum Measurement or larger than any of the maximum

dimensions plus 9 d, and/or maximum volume marked on the device plus 9 d, or when a combination of dimensions, including ~~tare~~**dimensional offset**, for the object being measured exceeds the measurement capability of the device, the indicating or recording element shall either:

(a) not indicate or record any usable values; or

(b) identify the indicated or recorded representation with an error indication.

(Amended 2004, ~~and~~ 2017 **and 20xx**)

S.2. Design of Zero and ~~Tare~~Dimensional Offset.

S.2.1. Zero or Ready Adjustment.

….

S.2.2. ~~Tare~~Dimenisional Offset. – ~~The tare function shall operate only in a backward direction (that is, in a direction of underregistration) with respect to the zero reference or ready condition of the device. The value of the tare division or increment shall be equal to the division of its respective axis on the device. There shall be a clear indication that tare has been taken.~~ **The dimensional offset shall eliminate the effect of the conveyance method resulting in the measurement of only the object intended to be measured.**

(Amended 20xx)

S.2.2.1. Maximum Value of ~~Tare~~Dimensional Offset for Multi-Interval (Variable Division-Value Devices). – A multi- interval device shall not accept any ~~tare~~**dimensional offset** value greater than the maximum capacity of the lowest range of the **height** axis ~~for which the tare is being entered~~.

(Added 2016 **and 20xx**)

~~**S.2.2.2. Net Values, Mathematical Agreement**. – All net values resulting from a device subtracting a tare entry from a gross value indication shall be indicated and recorded, if so equipped, to the nearest division of the measuring range in which the net value occurs. In instances where the tare value entered on a multi interval device is in a lower partial measuring range (or segment) than the gross indication, the system shall either alter the tare entered or round the net result after subtraction of the tare in order to achieve correct mathematical agreement.~~

~~Consider a multi-interval device having two partial measuring ranges for the "x" axis:~~

- ~~Partial measuring range 1: 0 to 100 inches in 0.2 inch increments~~
- ~~Partial measuring range 2: 100 to 300 inches in 0.5 inch increments~~

~~The following examples clarify the two acceptable methods this device can use to achieve mathematical agreement when tare has been entered in a lower partial measuring range than the gross indication.~~

~~(Added 2016)~~

~~**Acceptable Example 1. Altering of a Tare Entry to Achieve Accurate Net Indication**~~			
~~**Gross Indication of Item Being Measured**~~	~~**Tare Entered**~~	~~**Value of Tare after Being Altered by the Device**~~	~~**Acceptable Net Indication**~~
~~154.5 in~~	~~41.2 in~~	~~41.0 in~~	~~113.5 in~~
~~154.5 in~~	~~41.4 in~~	~~41.5 in~~	~~113.0 in~~

~~(Added 2016)~~

~~Acceptable Example 2. Rounding of the Net Result (Following the Subtraction of Tare) to Achieve Accurate Net Indication~~			
~~Gross Indication of Item Being Measured~~	~~Tare Entered~~	~~Net Result Before Rounding (Gross Indication minus Tare Entered)~~	~~Acceptable Net Indication Rounded to Nearest 0.5 Inch~~
~~154.5 in~~	~~41.2 in~~	~~113.3 in~~	~~113.5 in~~
~~154.5 in~~	~~41.4 in~~	~~113.1 in~~	~~113.0 in~~

~~(Added 2016)~~

Background/Discussion: See Appendix A, Page S&T-A291.

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

BLOCK 3 ITEMS (B3) TOLERANCES FOR DISTANCE TESTING IN TAXIMETERS AND TRANSPORTATION NETWORK SYSTEMS

Source:
New York Department of Agriculture and Markets

Purpose:
Provide the same distance-measurement tolerances for the Taximeters Code and Transportation Network Systems Code.

B3: TXI-20.1 T. Tolerances

Item Under Consideration:
Amend NIST Handbook 44 Taximeters Code as follows:

T. Tolerances

T.1. Tolerance Values.

T.1.1. On Distance Tests. – Maintenance and acceptance tolerances for taximeters shall be as follows:

(a) On Overregistration: 1 % of the interval under test **when the distance is 1.6 km (1 mile) or less. 2.5 % of the interval under test when the distance is greater than 1.6 km (1 mile).**

B3: TNS-20.1 T. Tolerances

Item Under Consideration:
Amend NIST Handbook 44 Transportation Network Systems Code as follows:

T. Tolerances

T.1.1. Distance Tests. – Maintenance and acceptance tolerances shall be as follows:

(a) On Overregistration: ~~2.5%~~ **1 % of the interval under test when the distance is 1.6 km (1 mile) or less. 2.5 % of the interval under test when the distance is greater than 1.6 km (1 mile).**

(b) On Underregistration: ~~2.5 %~~ **4 % of the interval under test.**

Background/Discussion: See Appendix A, Page S&T-A292.

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

OTH – OTHER ITEMS

OTH-16.1 D Electric Watthour Meters Code under Development

Source:
NIST OWM

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 2019-2020 NCWM cycle.

The USNWG will provide regular updates on the progress of this work and welcomes input from the community. For additional information, contacts for the subgroups of the USNWG are:

Electric Vehicle Refueling Subgroup:

- Chairman, Tina Butcher at tbutcher@nist.gov or (301) 975-2196
- Technical Advisor, Juana Williams at juana.williams@nist.gov or (301) 975-3989

Electric Watthour Meters Subgroup:

- Chairman, Lisa Warfield at lisa.warfield@nist.gov or (301) 975-3308
- Technical Advisor, Tina Butcher at tbutcher@nist.gov or (301) 975-2196

Background/Discussion: See Appendix A, Page S&T-A293.

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

OTH-18.4 Appendix D – Definitions: batch (batching)

Source:
Kansas

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

Item Under Consideration:
Amend NIST Handbook 44, Appendix D. Definitions as follows:

batch (batching) - The combining or mixing of two or more materials or ingredients using weighing and/or measuring devices or systems to produce a finished product whose quantity is determined from those weights and/or measurements.
(Added 20XX)

Background/Discussion: See Appendix A, Page S&T-A294.

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

OTH-20.1 Appendix D – Definitions: submeter

Source:
USNWG EVF&S

Purpose:
To provide a clear technical definition of what a sub-meter is.

Item Under Consideration:
Amend NIST Handbook 44, Appendix D. Definitions as follows:

Submeter - a meter or meter system downstream of the master meter.

(Added 20XX)

Background/Discussion: See Appendix A, Page S&T-A297.

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

Mr. Loren Minnich, Kansas | Committee Chair
Mr. Jason Flint, New Jersey | Member
Mr. Josh Nelson, Oregon | Member
Mr. Brad Bachelder, Maine | Member
Mr. Jason Glass, Kentucky | Member
Mr. Luciano Burtini, Measurement Canada | Canadian Technical Advisor
Mr. Rick Harshman, NIST, OWM | NIST Technical Advisor
Mr. Mike Manheim, 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)

GEN – GENERAL CODE

GEN-20.2 G-T.1. Acceptance Tolerances

Background/Discussion:
Handbook 44 lacks clarity regarding the application of acceptance tolerance when evidence exists that a commercial device has been calibrated during the past 30 days (for example maintenance documents or calibration decals are applied demonstrating equipment calibration). The General Code G-T.1. does not state that acceptance tolerance would apply in this situation. However, Appendix A, Section 2.1 states "Acceptance tolerances are applied to new or newly reconditioned or adjusted equipment, and are smaller than (usually one-half of) the maintenance tolerances" (underline added)

G-UR.4.3 states that whenever equipment is adjusted, the adjustments shall be so made as to bring performance errors as close as practicable to zero value; therefore, it would appear that acceptance tolerance should be the appropriate tolerance to apply. If opposition exists to this interpretation, Appendix A, Section 2.1 should be modified to clarify that acceptance tolerance does not apply to adjusted equipment.

Regional Association Comments:
WWMA 2019 Annual Meeting: Ms. Michelle Wilson (AZ), submitter of the item, pointed out that there are inconsistent references in HB 44 including G-UR.4.3., G-T.1., and Appendix A, section 2.1. Arizona is questioning the correct tolerance (maintenance or acceptance) to apply following adjustments to a device. Arizona does not have a position on which tolerance should apply and is seeking clarification on this issue.

Mr. John Barton (NIST) stated that this issue has been noted in the past and that it presents concerns to device owners and service agents as to the implications of making routine adjustments during regular service intervals. For example, a service agent may have reservations about making adjustments to a device knowing that there would be a possibility that the device would be subject to the application of acceptance tolerances by regulatory agents within 30 days following such adjustment.

The Committee agrees that item has merit. The Committee also agreed that item is not yet fully developed, and the item should move forward as a developing item. The Submitter is encouraged to address all requirements currently in NIST Handbook 44 that are lacking in consistency with regard to the application of acceptance tolerance. The Committee would also encourage additional input from other regional associations and stakeholders as to what tolerances should be applied in these cases.

SWMA 2019 Annual Meeting: Hal Prince (FL) stated that the submitters' main objective with this item is to gain clarity on when to apply Acceptance Tolerance. After considering this item the Committee recommends this item become Developing. The committee's main concern on this issue is the language "where evidence exists." The committee would like that language to become more defined.

NEWMA 2019 Interim Meeting: The Committee agrees with the body that the changes proposed are unnecessary and that the item should be withdrawn. During open hearings, the Committee heard from Mr. Jim Willis (NY) and Mr. John McGuire (NJ) who believes the proposal has no merit and is redundant.

CWMA 2019 Interim Meeting: Several regulators recommended the item be withdrawn. Adding this requirement could place an undue burden on the owners of devices that are capable of performing within applicable tolerances as currently required by G-T.1.

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

BLOCK 2 ITEMS (B2) DEFINE TRUE VALUE FOR USE IN ERROR CALCULATIONS

B2: GEN-20.1 G-T.3. Application. and Appendix D – Definitions: true value
B2: SCL-20.1 N.1.12. Reducing Rounding Error, T.1. General, T.N.2.1. General.
B2: SCL-20.2 S.1.2.2. Verification Scale Division.
B2: SCL-20.3 S.5.4. Relationship of Minimum Load Cell Verification Scale Division to the Scale Division.
B2: SCL-20.4 Table 3. Parameters for Accuracy Classes.
B2: SCL-20.5 Table S.6.3.a. Marking Requirements, Note 3.
B2: SCL-20.6 T.N.1.2. Accuracy Classes and T.N.1.3. Scale Division.
B2: SCL-20.7 Table 6. Maintenance Tolerances.
B2: SCL-20.8 Table 8. Recommended Minimum Load.

Background/Discussion:
Most scales under the Scales Code are designated by the manufacturer to have a values of e that equals d. Where e and d are not equal, there has been confusion in interpreting the Scales Code since the Code was adopted in 1984 (taking effect in 1986). This confusion came to the forefront with the needs arising from the cannabis trade. I believe that there were errors in translating OIML R76 (the basis of the current Scales Code) to HB44 format, there were key issues that were lost in translation, and finally there is misunderstanding of the HB44 Code that contributed to this confusion. My proposal will seek to identify the sources of confusion and offer revisions to make correction.

In this discussion I will be using the OIML term instrument when referencing a complete scale or weighing system. This eliminated the dual meaning of the term "device." A device will only refer to functioning parts of an instrument. Finally, the term "scale" will not be a weighing instrument. Scale will refer only to the measurement scale, i.e. analog graduations or digital divisions.

1. Determining Error in Verification

GEN-20.1.
In 2017, item 3200-7, a proposal to revise the expression of tolerances in several codes, was considered and withdrawn by the S&T Committee. The proposal aimed to correct the missing reference in those codes to errors of overregistration and underregistration. It also included a change to the definition of overregistration and underregistration that was prompted in part to a lack of understanding of the process of verification. Many of the comments received indicated that it was better handled through training. Additionally, the NCWM is working on the issue of alternative test methods which directly impacts the subject of verification. In reviewing the 2017 proposal again, I believe the real problem is a misunderstanding of the process of verification itself, stemming from a missing definition for "True Value."

The new definition and changes to the General Code correct deficiencies in the code. The "true value" has never been clearly defined in code although it may be inferred from the definitions. The concept of true value is essential to understanding verification process as it is used throughout the Handbook. It is also a legal issue establishing the basis for tolerance decisions with the uncertain test procedure clearly stated. Our decisions are based on the true value derived from a traceable standard and not based on the standard itself. Once established, the true value is considered to have no error for purposes of legal verification. In our tests, the uncertainties in the test procedure are unquantified. If you have to defend your test in court and are asked about the uncertainty in your test, what will you answer? With the addition of the True Value definition, you have a traceable test report for your standard and the text of G-T.3. regarding the legality of the specified test procedure. The verification process formally addresses the risks in two ways. First the risks are kept small by the standard and procedure specified. Second, the risks are shared equally between buyers and sellers. The enhancements explain clearly how errors are computed and how they are interpreted.

The addition of a % error definition in G-T.3. corrects a deficiency that was identified in testing LMD's. The tolerances in the LMD codes are expressed using errors of overregistration /underregistration (device indication – true value). Yet we in the US traditionally calculate those errors as errors of excess/deficiency (true value – device

indication). When calculating % error in these calculations, it seemed appropriate to put the device indication in the denominator, but this is incorrect. All error calculations must be in terms of the true value, especially % calculations.

SCL-20.1
The addition of the Note addresses the issue of digital rounding. Parallel to R 76, the note requires errors to be determined to a resolution of at least 0.2 e. Remember that error = indication – true value, and the true value is normally the nominal value of the test weight. That means determining the indication to a resolution of 0.2 e or finer using error weights or other means when e >=2 d, or by directly reading the indications when e >= 5 d. This means if e = 5 d or e = 10 d, the indication is resolved fine enough to reduce the rounding error. In R76, the requirement is to "eliminate" rounding error, but this is not possible. You can only reduce it to 0.5 of whatever division size you resolve the indication. Hence, the proposal uses the term "reduce" instead of "eliminate." The waiver allows field inspectors to continue to use direct reading when e = d, with a resulting rounding error of 0.5 e. This accepts the additional risk of passing devices outside the tolerances. (See section 4 of the proposal)

The changes to the two Scales Code tolerance paragraphs create a specific reference to the type of error in G-T.3. In this case it formally states errors are errors of overregistration/underregistration. The other change in T.1.1. addresses the missing part about applying tolerances to net values as well as gross values for unmarked scales. I believe this was just an oversight in 1984, as applying tolerances to either gross or net loads had been the established practice long before the 1984 changes to the Scales Code.

2. Correct Code references to ensure correct reference to either e or d, as appropriate

SCL-20.2
Section S.1.2.2. is not dealing with the verification scale division e as the title implies. Instead it is dealing with special requirements for instruments designed such that e does not equal d.

Section S.1.2.2.2. is not a specification issue directed to the manufacturer but rather a question of suitability. It should have been put into the User Requirements section 1. Selection Requirements. For a discussion of the option to delete this refer to part 4 of the proposal.

SCL-20.3
The correct value for the table is e. The use of d in the formulas only works when e = d. That is addressed in the note * below, which is not necessary when e is used in the formulas.

SCL-20.4
- The inclusion of references to d in the header to column 2 of the table is technically incorrect. The verification scale division must refer only to e.
- The change to Note 1 serves to eliminate the confusion about considering e to be the digit to the left of d, and ensures the e value comes from the markings on the device. It is the manufacturer who choses e for classification purposes.
- The changes to note 3 correctly references the verification scale division e and not the scale division d, and they clean up some grammatical errors.

SCL-20.5
The change clarifies that the verification scale division is equal to the marked d when no separate marking of e is provided. Note that nothing in Note 3 prevents marking d = 1 g e = 1 g, or capacity 10000 g x 1 g e =1 g. The change to the last sentence cleans up a nonsensical term "weight unit." The scale division must be in a unit of weight, e.g. g, kg, lb, etc. The intent was to have each range of a multi-range device include a capacity and division size n. Note R76 requires marking of Class, Max (capacity), and e, with a marking of d is only required when e <>d

SCL-20.6
The change to T.N.1.1.2. corrects the contradiction between the current code using d and the definition using e in determining accuracy class. The value of n in the definitions already correctly refers to e

The change to T.N.1.1.3. is an attempt to clarify (e) and (d) similar to R 76 in Table 2. Note that when e=d, under S.6.3. only one marking is required. It is only when e ≠ d that S.6.3. requires both to be marked. The addition of material for ungraduated analog devices is housekeeping since d has no meaning for these devices. The change also clarifies that some requirements are directed to d (functional requirements on the device) and some to e (relating to classification and tolerance values).

3. Discuss issues of suitability of scales when e and d are not equal

SCL-20.7

It is the value of e that is used in specifying tolerances according to the definition of e, and all values in this table must be expressed in terms of e. The table is currently written in terms of the scale division d, which is technically incorrect.

SCL-20.8

The parenthetical (d or e) in the headers to columns 2 and 3 is confusing when the two are not equal. Which one do you use? The note may address Class I and II devices but it does not help with weight classifiers in Classes III and IIII, where you certainly don't want to use d.

It is vital to note that for instruments under R76 the manufacturer is required to mark a minimum load (Min). The manufacturer calculates Min using e. However, the minimum load is marked in mass units matching the instrument display in divisions of d. There is no confusion since it is marked on the instrument. In HB44 the inspector must determine the minimum load from Table 8 and the scale markings. Most users don't even know this requirement exists, unless told by the inspector.

Table 8 is addressing the large significance of rounding error at small loads. The table must be clear to ensure the correct scale division is used in enforcement. The table at right shows the relative errors resulting from roundoff to the nearest scale division d at various loads in the table. In principle, we are trying to ensure loads weighed are sufficient to reduce the relative errors to the levels shown, i.e. for Class I – 0.5%, for Class II – 1.0%, Class IIIL – 1.0%, for Class III – 2.5%, and Class IIII – 5%. While these might seem large initially, there is a diminishing returns effect. A small percentage of a small number tends to be insignificant. Because the value of commodities goes up as the accuracy goes up, we have more stringent requirements on Classes I and II.

Load d	Relative Error
10	5.0%
20	2.5%
50	1.0%
100	0.5%

Scales fall into three categories, i.e. with e > d, e = d, and e < d.

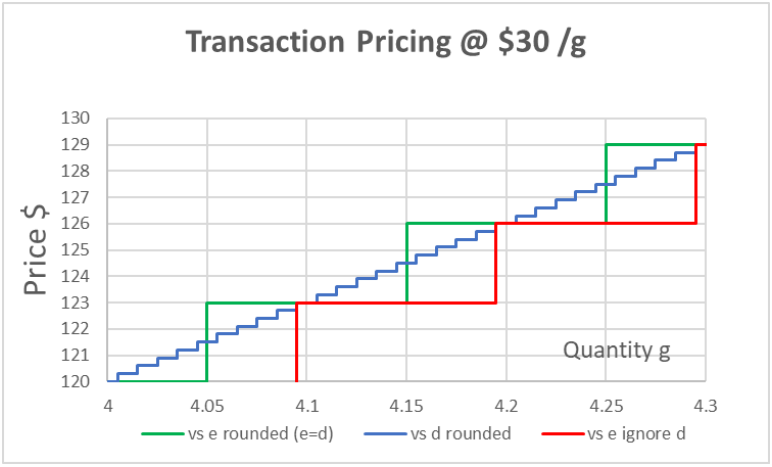
- If e < d, e.g. weight classifiers, it seems clear the appropriate choice is e. The table in the second note specifies d, which is technically incorrect. For example, a Class III weight classifier with d = 50 g e = 1 g, the relative accuracy of 5% is reached at 10 e. At 10 d or (500 e) the relative error due to rounding is 0.1%.
- If e = d, it doesn't matter.
- If e > d, on some Class I and II scales, you get the desired relative error when you use d. If you use e, the scale with e ≠ d will result in much smaller rounding error since the rounding is internally applied to d and not to e. Examples: If e = 0.1 g, then 50 e is 5 g and the rounding error is 0.5 e / 50 e = 1%, i.e. the desired level for Class II. If e = 0.1 g and d = 0.01 g, then 50 e is 5 g and the rounding is to 0.5 d or 0.05 e, thus the rounding error is 0.05 e / 50 e = 0.1%. This may be why the parenthetical (d or e) is used in the current language. Perhaps it was intended that we use the smaller value of the two if e and d are different. The proposal states e is used in cases where e < d and d is used in all other cases. This eliminates any confusion. We may consider adding a marking of Min as per R76 as a future idea.

The change to the * note performs a similar function to the change in Note 1 in Table 3, as it disconnects e from d and relies solely on the markings of d and e.

In 2017, the NCWM added S.1.2.2.2. to prohibit use of Class I and II scales with a differentiated scale division. One argument was that the differentiated digit would cause confusion. There were arguments in opposition to the proposal. I argued that the confusion rested mostly with the weights and measures community (see earlier discussion). Plus,

the finer digit extended the usable range of the scale since you could reach the 1% limit to rounding error at 50 d. For a Class II scale with e = 0.1 g and d = 0.01 g, that means weighing small loads down to 0.5 g loads which is something that users need in the cannabis trade.

One issue involves the rounding errors addressed in Table 8. A more critical issue in my view is the pricing increments. At $30/g, 0.1 g e represents a pricing increment of $3. By displaying 0.01 g d, that 0.01 g d reduces the price increment to $0.30. This is displayed in the graph at right. The blue line shows the 30 cent steps if you use the differentiated d. If you use the digit to the left of the differentiated d, you see the counted divisions e discussed earlier. The gap between the blue and red lines show the losses to users if they are forced to round down. The green line shows pricing on a normally rounded scale with 0.1 g e. The normal rounding shares the risk equally between buyer and seller.



If the user must have a scale with e = d, then it forces them to go to 0.01 g e to service loads at the 1 g level. For that scale 50 e is 0.5 g, and the 1 g loads weighed are near 100 e. Precision scales rarely use 2 or 5 divisions, so capacities get reduced by a factor of 10 to move down to the next smaller division size. Blocking the use of e=10d may force many users to purchase two scales where a single scale would have been suitable if using a scale with a differentiated d were not blocked.

4. Discussion regarding disconnecting e from d

Sections in the current Scales Code are being incorrectly interpreted to imply there is a direct connection between e and d. Essentially there is a belief when inspecting Class II scales when e does not equal d that we are somehow verifying the first digit to the left of d. Even when e = d, there is a belief that we are verifying d. That fails to follow the principles incorporated in G-T.3. We are not verifying the division, we are verifying the entire instrument indication at an applied load.

The scale division d is defined as the smallest division of the instrument under test (IUT). The scale division is referred to extensively in the code and we find that requirements written around d regulate the operating characteristics of the instrument, e.g. discrimination. When reading analog indications we round to the nearest graduation (See Appendix A. Section 10). Under General Code G-S.5.2.2.(d), there is an important requirement that the smallest division of any digital device round off. Unless specifically designated the instruments in HB44 are in "normal rounding" class of instruments. Even with normal rounding, it is critical to understand that the digits to the left of the least significant digits are not rounded. They are counted. For example, as you count the rounded-off d's, when you increment from 9 to 0 in the least significant digit, the next digit increments 1 digit. The break point between digits to left of the least significant digit always occurs at 9.5 d. If d is 1 g, then the tenth d is counted as 10 g and the 100th d is counted as 100 g, etc. Normal rounding of the tens place would normally occur at 5.0 d. If you attempt to apply tolerances to e and just ignore d, you are not rounding in conformance to G-S.5.2.2.(d). Instead you are rounding down, which places the scale user at a disadvantage and disrupts equity.

UR.3.10. addresses dynamic monorail scales, which also have e ≠ d, and requires that the commercial transaction using these devices shall be based on e, interpreted to mean the digit to the left of the differentiated d. These transactions therefore must be based on a counting scale (rounding down) instead of a half-up/half-down system as required in G-S.5.2.2.(d). When applied to a high-priced commodity at $30 /g, the pricing errors add up because the scale user is forced to always round down. The table at right shows the impact, and this impact can be attributed to every transaction. At $30/g, the average loss to the user per transaction is $1.35. That is not equity!

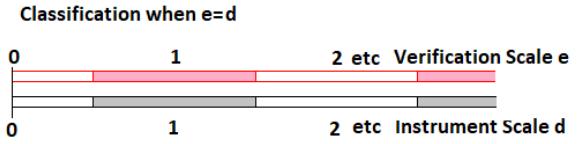
Indication	$ Using d	$ Using e	$ gain/loss
0.95	$28.50	$27.00	-$1.50
0.96	$28.80	$27.00	-$1.80
0.97	$29.10	$27.00	-$2.10
0.98	$29.40	$27.00	-$2.40
0.99	$29.70	$27.00	-$2.70
1.00	$30.00	$30.00	$0.00
1.01	$30.30	$30.00	-$0.30
1.02	$30.60	$30.00	-$0.60
1.03	$30.90	$30.00	-$0.90
1.04	$31.20	$30.00	-$1.20
1.05	$31.50	$30.00	-$1.50

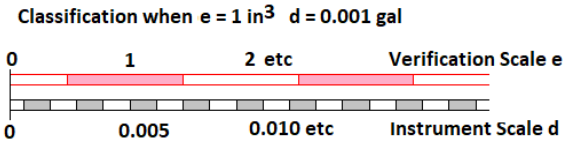
Verifying a scale division is virtually impossible. For a Class II device the accuracy requirement is approximately 0.01% of applied load. If the division is 0.1 g, then the required accuracy is ± 0.00001 g and we are trying to measure that with a resolution of 0.1 g. In addition, we don't have standards below 1 mg.

I contend that e is not the digit to the left of the differentiated d! Nor do we verify e. Careful reading of the definition of the verification scale division "e" in Appendix D will reveal no direct connection between e and the indications on the instrument being verified. The verification scale division is a mass (weight) value declared by the manufacturer in required markings that is used in classifying instruments and in specifying tolerances for the device. In the header to column 2 in Table 3., we find the expression "Verification Scale Divisions (d or e^1). This is another chance to misunderstand the Code. The verification scale division must be e according to the definition. It can't be d, although it can have the same value as d. Similarly, reading Note 1 in Table 3, you might conclude that e is the value of the digit immediately to the left of d. The critical distinction is that e is a <u>value</u> of that digit and not the actual division of the display. To avoid confusion, I propose amending Table 3. to simply direct you to the scale markings to find e and remove any reference to the digit in the display.

The e value is also used in classifying instruments in the Scales Code. Classes refer to relative error ranges. This comes from the ratio MTol / e. At the second step in the tolerance structure in Table 6. Under HB44 a Class III instrument is ~0.1% accurate. This is 2 e tolerance for a load of 2,000 e. A Class II instrument is accurate to ~0.01 %, or 2 e error for a load of 20,000 e. However, the tolerances within a class are stepped, such that the % error varies through the operating range. For Class II the relative errors are 0.02% at 5,000 e, 0.01% at 20,000 e and 0.0033% at 100,000 e. The manufacturer decides what class and relative accuracy he needs to serve (based on capacity and n) and designs accordingly.

If e is not a division on the instrument, what is it? In R76, the basis of our current Scales Code, the term "scale" is not used to refer to a weighing instrument, but rather the graduations or divisions, i.e. the "scale" of indication. Thus, a scale division is not limited to weighing devices. A register on an LMD has a "scale division," e.g. a RMFD typically indicates in 0.001 gal divisions of scale. It should be easy to see the 0.001 gal increments correspond to d in the Scales Code. When we verify the RMFD, we use a test measure with an independent scale, either 1 in^3 for older measures and 0.5 in^3 for newer measures. The "verification scale" for the RMFD is therefore the "scale" on the test measure used to determine the true value. The instrument scale and the verification scale connect at only one point, at ZERO! Error arises when the two scale diverge as you move along the measurement scale due to linearity errors, influence factors, random variations, etc within the instrument. The Verification Scale is considered to have no error.



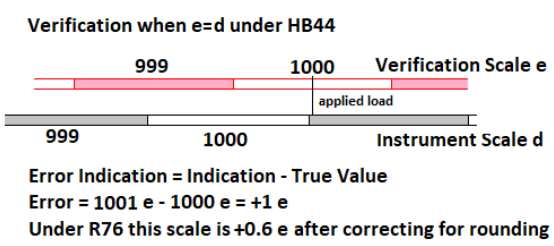


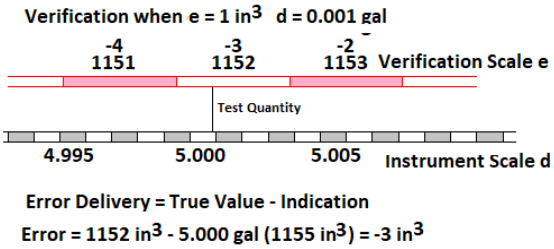
Above at left, the graphic shows a case where e = d. Notice how the divisions d and e both begin at center zero and the divisions align perfectly because at this magnification it is impossible to see small differences. The test evaluates

the sum of many divisions in order to see any deviation. Above at right, the graphic shows how the 1in^3 e for the RMFD verification aligns with the 0.001 gal d of the instrument. Now imagine what happens when a test is performed.

Classification is based on relative error. This allows the verification scale division to differ from the instrument scale division, sometimes larger and sometimes smaller. With the RMFD above right, d is significantly smaller than e. In fact, the 6 e maintenance tolerance is 25 d. The two scales are independent. Would anyone suggest that the d smaller than e is inappropriate for commercial use. We verify the RMFD to e just like the weighing instrument with e = 10 d. The confusion comes from the requirement to differentiate d on these instruments.

Why does the Code require d to be differentiated when d is smaller than e? That is the critical question. It is not because d is somehow inaccurate or unreliable. It is not because d is smaller than the e of the tolerances. I believe it is because the code wanted to ensure that the serviceperson or official did not use d for tolerance calculations. It had nothing to do with users or customers.





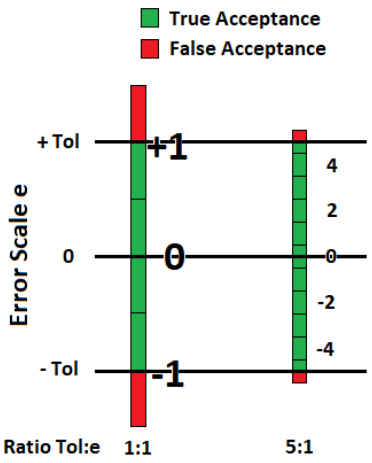
In the above graphics, the instrument scale diverges from the verification scale. They both started at the same zero reference. Notice that the RMFD at right calculates delivery error vs indication error at left. The key is to understand that the verification scale has no error and we are measuring the deviation of the instrument scale from the verification scale.

This pattern holds true for other verification tests, from tests of packaged goods with a reference scale to tests of taximeters on a road course. Circling back to the proposed definition of true value, in addition to its use in classifying scales, **the verification scale is that "scale" used to measure the true value. The division of that "true value" measurement scale is "e."** With the new G-T.3. that true value is the legal basis of our tests and is known without uncertainty. A table of a variety of verifications and their d and e scales are provided below.

Instrument & quantity	Instrument scale division d	Verification scale division e	Maintenance Tolerance	Ratio MT/e
RMFD @ 5 gal	0.001 gal	1 in^3 0.5 in^3	6 in^3	6 12
VTM @ 100 gal	0.1 gal	5 in^3	~70 in^3	14
Rack @ 1,000gal	1 gal	0.1 gal	3 gal	30
Mass Flow Class 0.3	<= 0.2% MMQ	<= 0.02%	0.3%	15
Taximeter @ 1 mi	0.2 mi	~0.001 mi (!5 ft)	+0.01/-0.04 mi	10/40
Package Checking @ 1 lb @ 4 oz	N/A N/A	<= 0.005 lb <= 0.002 lb	0.044 lb 0.016 lb	8.8 8
IIII scale e = d @ 200 d	1 d	1 e = 1 d	2 e	2
III scale e = d @ 2,000 d	1 d	1 e = 1 d	2 e	2
II scale e = d @ 20,000 d	1 d	1 e = 1 d	2 e	2
II scale e = 10 d @ 20,000 e	1 d	1 e = 10 d	2 e	2

The last column of the table is the real focus of verification. We want to have sufficient resolution in determining errors. Although the issue is a bit more complicated, this ratio is a measure of the effectiveness of the verification. Special notes:

- For the RMFD, VTM, and Rack instruments the ratio is limited by HB105-3 and the specified minimum division of the prover scale. This becomes part of the code when you specify the prover must meet that specification.
- For the mass flow instruments the Notes provide no guidance on the verification scale division. I submit the value of resolution in error should be in HB44 Notes for all Codes, similar to R76 for weighing instruments. This is something I hope the work group on alternative test methods addresses. The EPO does specify the reference scale division be no larger than 1/10 of the smallest tolerance applied. This means the Mass Flow code requires a minimum ratio of 15:1 for maintenance tolerance which I believe is overkill and very costly. Compare to 5:1 elsewhere.
- For scales the ratio is only 2:1 as currently written in Handbook 44. There is no mention of error weights in the Code. In R76, the ratio is specified in that it requires errors to be determined to at least 0.2 e. This produces a ratio of 5:1 in the fist step, 10:1 in step two and 15:1 in step three. If you determine errors to 0.1 e, as we do normally with error weights, it allows you to double those ratios and provide 10:1 in the first step. Reading the errors in d when e = 5 d or e = 10d, allows you to meet the minimum without using error weights (or expanded resolution).



Why use maintenance tolerance in computing this ratio? In verification, there is a shift in emphasis relative to calibration. In verification, your primary concern is with the population. You want all the devices in the same commercial field to have performance that is similar enough to promote equity. Even if you are little sloppy in applying acceptance tolerance, the instrument is highly likely to perform within maintenance tolerances. In calibration, the focus is always on a single artifact or instrument.

Why is this resolution in determining errors important? The short answer is to reduce the incidence of false acceptance/rejection. The Range of False Acceptance (RFA) can be defined as the portion of the compliant measured error that reaches outside the tolerance limits due to rounding in the error calculation. Limiting the RFA is the objective in specifying the resolution of errors.
When we use direct reading in testing weighing instruments the ratio of Tol:e in the first tolerance step is 1:1 and we have an RFA of ½ e in proportion to the 1 e tolerance. The RFA is 50% of the tolerance, meaning we can accept instruments in error up to 1.5 times the tolerance. When we add the R76 requirement to measure errors to 0.2 e we increase the ratio of Tol:e to 5:1 and thereby reduce the RFA to 0.1 e in proportion to the 1 e maintenance tolerance (see graphic ar right). This RFA is only 10% of the tolerance. Statistically, it can be shown that the RFA contributes to the population variability based on the Root Sum Square. At ½ e RFA when Tol:e is 1:1, the population variability gets increased by 22%. When we increase the Tol:e ratio to 5:1 the population variation is only increased by 1%, which is not considered significant.

A better way to express this in is terms of compliance rate. Imagine your test data shows compliance of a class of devices as 95% at 1 e tolerance, but you are testing using direct reading. Due to rounding in measuring the error that you are not addressing, 95 % of the instruments are actually within 1.22 e and not the 1.00 e indicated in the compliance data. By increasing the Tol:e ratio to 5:1, 95% of the instruments are accurate within 1.01 e.

Regional Association Comments:
WWMA 2019 Annual Meeting: Mr. Kurt Floren (LA County, CA.) stated that footnote #1 under Table 3 in item SCL-4 should have the words "be" and "to" stricken to correct grammatical errors. Mr. Kevin Merritt (ID), stated that the term "certified" as used in the proposed new language being recommended under item SCL-20.1 for Scales Code paragraph T.1. General, should be clarified/defined. He suggested the replacement of "certified" test load with language more in line with NIST traceable standards.

Regarding item SCL-20.2, Mr. Steve Harrington (OR) commented that still believes there is merit in the proposed changes but suggested removing the retroactive date to allow devices now in service to remain in service. Mr. Russ Vires (SMA) provided some history of the use of both "d" and "e" for scales and that field inspectors did not have the appropriate test weight to properly test these scales to the finest resolution. While supported initially by the SMA,

it was not realized that this proposal would have unintended consequences related to the jewelry industry where "d" is commonly used in weight determinations. The SMA recommends that the retroactive date be eliminated to allow manufactures additional time to change the designs on their equipment and so existing scales can continue to be used. Mr. Vires also suggested that this requirement could be formatted as a user requirement.

Mr. John Barton (NIST) stated that the exclusion of jeweler's scales in this requirement could provide reason to exclude other applications and this may be a "slippery slope."

Mr. Harrington stated that he could also support the proposal formatted as a user requirement

The Committee agreed that this proposal does not address any known significant issues and has the potential to create additional confusion. The Committee agrees that the changes proposed are unnecessary and that the item should be withdrawn.

SWMA 2019 Annual Meeting: Diane Lee (NIST) expressed concern about whether or not "True Value" is the appropriate term to be used in this item. Tim Chesser (AR) stated that he doesn't like the "True Value" language. Russ Vires (SMA) stated that the Scale Manufacturer's Association has not met on this issue. Steve Benjamin (NC) also pointed out two typographical errors. On page 7, lines 12 and 17, the "(+)" next to "Minus" should be changed to "(-)". The committee would like more input from other regions on this item and recommends that it be a Developing item.

NEWMA 2018 Interim Meeting: The Committee agrees with the body that the item has merit and should be assigned a Developing status. No comments were heard during open hearings.

CWMA 2019 Interim Meeting: Comments were received in support of these items. There was concern that the definition for "true value" may not be appropriate. There are some other editorial issues that need to be addressed including footnote 1 in Table 3. The use of the term verification scale division in Table 6 may also be confusing in instances when the division in use is not the value specified by the manufacturer.

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

SCL – SCALES

SCL-17.1 I S.1.8.5. Recorded Representations, Point of Sale Systems

Background/Discussion:
This item has been assigned to the Point-of-Sale Tare Task Group (POST) for further development. For more information or to provide comment, please contact:

TG Chair Loren Minnich
Kansas Department of Agriculture
P: (785) 564-6695
E: loren.minnich@ks.gov

The submitters of this proposal state that it will 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.

Additionally, it is purported that 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.

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 2018 NCWM Interim Meeting, the Committee heard from Mr. Loren Minnich (KS) who commented that the item will benefit consumers and asked the Committee to move the item forward as a voting item. Many comments both in support of and in opposition to the proposal were heard. The Committee also received a written recommendation asking the Committee to consider modifying the proposal to: (1) require the tare weight and/or the gross weight be printed on the receipt; (2) clarify printed weight values must be clearly and definitely identified as gross, tare, and/or net weights (as required by the General Code); and (3) move text currently in a footnote to the paragraph into the body of the paragraph for ease of reference.

During the Committee's work session, the committee members reviewed all information received and agreed to move the item forward as a "Voting" item without change.

During the 2018 NCWM Annual Meeting, the Committee agreed to assign the further development of this item to an NCWM task group (TG) and established that the goal of this task group should be to determine how to provide consumers (and operators) with the information necessary, whether on a receipt or displayed on the POS system itself, to verify that charges for items weighed at checkout are based on net weight, similar to the opportunity provided them by retail-computing scales used in direct sale applications.

The Committee also received several comments in opposition including a comment from Mr. Russ Vires (Mettler-Toledo, LLC), speaking on behalf of the SMA, stating that the SMA opposes the agenda item and feels it would be too costly to implement with little benefit. Additionally, the Committee received written comments including those from Ms. Elizabeth K. Tansing, on behalf of the Food Marketing Institute, opposing the item and requesting that the Committee withdraw the proposal. During the committee's work session, the proposal was amended to only include changes to paragraph S.1.8.5. and to include a nonretroactive enforcement date of January 1, 2020.

The Committee received numerous comments on this item suggesting additional work is needed to further develop the proposal and recommending a new task group made up of regulatory officials, food marketing representatives, POS software programmers, NIST, and others. Two of the original submitters of the item, Ms. Julie Quinn (Minnesota) and Loren Minnich (Kansas) spoke in favor of assigning the item to a work group; one noting that the complexities of packaging are more involved today than first realized indicating the need for this proposal to be looked at more in depth.

The Committee also received numerous written letters from the grocery store industry opposing the item and requesting that the Committee withdraw it to include: the NC Retail Merchants Association, FL Retail Federation, SC Retail Association, Food Marketing Institute (FMI), and others. In consideration of the number of comments received on this item in support of its further development by a work group, the Committee agreed to recommend this item be assigned to an NCWM Task Group (TG).

At the 2019 NCWM Interim Meeting, the Chairman of the NCWM POS Tare Task Group, Mr. Loren Minnich (KS), provided an update of the Task Group's activities since it first formed following the 2018 NCWM Annual Meeting. He reported the main topics of discussion thus far have been:

- whether the addition of proposed part (e) to paragraph S.1.8.5., which adds "tare weight" to the list of required information printed on a receipt should remain non-retroactive, as submitted, or be changed, per NIST OWM's suggestion, to retroactive with an effective date ten years from the date of adoption; and
- which value should be added to the receipt, "tare" or "gross" weight.

Mr. Minnich recommended this item remain in an Assigned status given members of TG have been unable to reach a consensus on these issues. Cost of compliance is a concern. The Committee, in consideration of the comments received on this item, agreed with the recommendation of the POS Tare TG Chairman to maintain the Assigned status of the item to allow the TG more time for further discussion and development.

During the 2019 NCWM Annual Meeting, the POS Tare TG Chairman provided the Committee with an update on the TG's progress and presented two amended versions of S.1.8.5. and associated footnotes for the Committee to consider. Those two versions are shown under the Item Under Consideration.

The Chair of the assigned TG reported that members of the TG believe both versions of the amended S.1.8.5. are fully developed, but they were unable to agree on which version should be presented for final consideration. Both versions are being offered so that feedback can be solicited from the fall regional weights and measures associations. It is hoped this feedback will help the Committee to decide the most favorable version.

Regional Association Comments:

WWMA 2018 Annual Meeting: Mr. Russ Vires (SMA) reported the SMA had provided a position from their 2019 April meeting stating that this proposal would provide little if any benefit to the consumer. Mr. John Barton (NIST) stated that to not provide some indication to the consumer that tare has been taken violates the principle behind the General Code requirement G-S.5.1. That requirement states that weight indications for commercial transactions be clear, definite, and easily read. The consumer deserves to be assured that the commodity is being sold by net weight and that appropriate tare has been deducted. He also noted that the TG assigned to this item has offered two versions of the proposal. One is non-retroactive version and the other is a retroactive version. The Committee is encouraged to consider the implications of the status for the proposed requirement. The retroactive version will require that all POS systems comply with the requirement, and the non-retroactive version would allow those systems that are currently in service to be grandfathered. Mr. Kurt Floren (L.A. County, CA.) stated he supports the retroactive version of this proposal as long as it is not cost-prohibitive however, he does oppose the item even if the proposal was adopted as non-retroactive. He also recommended that the term "defined" as it appears in both versions of this proposal should be replaced with "indicated" or "designated." Mr. Steve Harrington (OR) stated he was concerned with the potential that smaller businesses will need to absorb the cost to comply with the requirement if the retroactive version was adopted.

The Committee agreed to support the non-retroactive version of this item as proposed in the item under consideration. The Committee also deliberated on the establishment of an effective date for the non-retroactive requirement. The Committee agreed to recommend that the effective date be January 1, 2024.

The Committee agrees that this item be given a voting status and recommends that additional input be solicited from the other regional associations and that input then be forwarded to the NCWM S&T Committee.

SWMA 2019 Annual Meeting: Russ Vires (SMA) opposed this item on the grounds that it provides no benefit to the consumer. The Committee recommends the non-retroactive version of this item be made a Voting Item.

NEWMA 2019 Interim Meeting: The Committee agrees with the body that the changes proposed are unnecessary and that the item should be withdrawn. During open hearings, the Committee heard from Mr. Jim Willis (NY) who believes the proposal will cause consumer confusion because while the tare is printed, there is no guarantee that it will be correct. Mr. John McGuire (NJ) agrees with the comments from NY.

CWMA 2019 Interim Meeting: Several comments were received in support of the non-retroactive version. There were suggestions that gross weight may be a better value to include since it could be clearer to consumers that they were charged on a net weight basis. We recommend the non-retroactive version move forward as a voting item and suggest the committee might consider replacing tare with gross weight.

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

SCL-16.1 A Sections Throughout the Code to Include Provisions for Commercial Weigh-in-Motion Vehicle Scale Systems

Background/Discussion:
These items have been assigned to the Weigh-in-Motion (WIM) Task Group for further development. For more information or to provide comment, please contact:

Co- Chair
Alan Walker
Florida Bureau of Standards
P: (850) 274-9044
E: Alan.Walker@FDACS.gov

Co- Chair
Tim Chesser
Arkansas Bureau of Standards
P: (501) 570-1159
E: tim.chesser@aspb.ar.gov

Rinstrum and Right Weigh Innovation (manufacturers of weigh-in-motion vehicle scale systems) submitted a proposal in 2016 to modify the tentative WIM Code for Screening and Sorting. 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. Specifically, 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.

In February 2016, the NCWM agreed to form a task group (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 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.

Information and details on the TG's work and any updates on progress made during 2016-2018 can be found in the S&T Committee's Final Reports for that time period.

During the 2019 NCWM Interim Meeting, the Committee heard testimony from Mr. Walker indicating that the submitter has made preparations for collecting data that would provide evidence that the Rinstrum WIM system can comply with the stated tolerances in the proposal. Currently, the TG has not been able to observe any data collection or receive conclusive results. During the committee's work session, the Committee agreed to maintain the Assigned status for this item.

During the 2019 NCWM Annual Meeting, the Committee received an update from Mr. Walker stating that the submitter, Rinstrum had completed the installation of a WIM system to be used to provide data and evidence to support the submitter's claims regarding these system's performance capabilities. However, the TG has yet to witness any of the data being collected. Upon the request of the TG's Co-Chair, the Committee agreed to maintain the Assigned status of this item.

Regional Association Comments:
WWMA 2019 Annual Meeting: Mr. Russ Vires (SMA) does not support the proposal as written, the SMA has submitted written comments in opposition to this item. Mr. John Barton (NIST OWM) informed the Committee that a commitment made by the submitter to provide an opportunity to members of the TG to witness data collection that will provide evidence that their device is capable of meeting the HB 44 Scales Code Class IIIL tolerances has not been met. As a member of the WIM TG, it is necessary to have evidence through the collection of test data showing that the submitter's device will meet the claimed performance and that the efforts of the TG are justified and worth continuing.

The Committee recommends this item be withdrawn due to the lack of substantiated evidence that the submitter's claims of their device performance capabilities can be validated.

SWMA 2019 Annual Meeting: Tim Chesser (Arkansas, WIM Task Group) stated that the WIM Task Group is awaiting direction from the National S&T Committee on this item. Russ Vires (SMA) stated that he opposes the item as written. Eric Golden (Cardinal Scales) asked if additional testing had been completed. Alan Walker (Florida, WIM Task Group) stated that additional testing had not yet been completed, and that they were currently waiting on direction from the chair of the National S&T Committee.

The Committee recommends this item remain Assigned, while the WIM Task Group awaits further testing.

NEWMA 2019 Interim Meeting: The Committee agrees with the body that this item has merit and should remain Assigned. During open hearing, the Committee heard comments from Mr. Dick Suiter (Richard Suiter Consulting) as a WIM Task Group member. He indicated that TG is waiting for more direction from S&T committee. The major concerns are that test data given by submitter was not witnessed by a weights and measures official.

CWMA 2019 Interim Meeting: A member of the WIM Task Group indicated that the group is waiting on data from the submitter. We recommend this item remain assigned to the WIM task group.

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

SCL-19.2 I T.N.3.6. Coupled-In-Motion Railroad Weighing Systems., T.N.4.6. Time Dependence (Creep) for Load Cells during Type Evaluation., UR.5. Coupled-in-Motion Railroad Weighing Systems. and Appendix D – Definitions: point-based railroad weighing systems.

NOTE: This item replaces the 2018 Items, Block 2 Items: SCL-1 & SCL-2 that were designated as Developing items by the submitter, Meridian Engineers Pty LTD. Refer to the Committee's 2018 Final Report to view the comments and recommendations that the Committee received on these items and the Committee's actions relating to them.

Background/Discussion:

In 2017 the submitter, Meridian Engineers Pty Ltd. submitted two proposals. The first of those proposals was to amend the NIST Handbook 44 Scales Code, Table 3 "Parameters for Accuracy Classes" to reduce the required minimum scale division value for coupled-in-motion railroad weighing systems that are not used for static reference weighing. The second proposal sought to align the acceptance tolerance values and establish accuracy classes in NIST Handbook 44 Scales Code for coupled-in-motion railroad weighing systems to harmonize with OIML R106 "Automatic rail-weighbridges.

At the 2017 NCWM Interim Meeting, the Committee grouped the two items in this proposal together and took comments on these items simultaneously since they were related. The submitter explained that due to the design and the technology used in their "point-based railroad weighing system" these systems would not comply with existing HB 44 static scale tolerances. Meridian Engineers Pty Ltd. did maintain however, that these systems would be capable of meeting HB44 Scales Code Class IIIL tolerances applicable to coupled-in-motion (CIM) railroad weighing systems.

The submitter also stated, the "pseudo load cells" used in Meridian's systems are significantly different than a typical load cell used in many static and dynamic weighing systems in commercial service. For this reason, Meridian Engineers Pty Ltd. believed it would be unfair to evaluate their systems based on requirements pertaining to load cells already in the HB 44 Scales Code. The submitter therefore solicited the NCWM to adopt the changes recommended in these proposals. Additionally, the proposed addition of multiple accuracy classes would align U.S. standards more closely with those in OIML R106.

At the 2017 NCWM Annual Meeting open hearings, the Committee grouped Agenda Items 3200-4 and 3200-8 together and took comments on those two items at the same time. A presentation was given by the item's submitter, Mr. Anthony Pruity (Meridian Engineers Pty Ltd.). The presentation provided an explanation for the changes being proposed and Meridian's perspective supporting those 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. A few questions were asked following Mr. Pruiti's presentation including:

- If this scale in not capable of meeting HB 44 (Table 3) Parameters for Accuracy Classes, what consequences can be expected by expanding the existing tolerances?
- What, and who will these changes benefit?

The Committee agreed to maintain the Developing status of this item based on the questions raised.

At the 2018 NCWM Interim Meeting, the Committee heard from Mr. Richard Suiter (Richard Suiter Consulting) representing Meridian Engineers Pty Ltd. (the submitter). Mr. Suiter asked that the item remain "Developing" because the submitter is working on changes which they plan to submit later this year. The NIST Office of Weights and Measures offered the Committee written comments related to these items. Those comments are as follows.

- This item proposes four different accuracy classes for CIM railroad weighing systems and therefore a choice is necessary to determine a weighing system's accuracy class that fits the intended application. The proposal however, doesn't provide any guidance on how this selection is to be made nor does it specify whom is to decide the appropriate accuracy class.

- This approach of specifying different accuracy classes in HB 44 is based on the intended use rather than the scale's level of precision and performance. That approach deviates significantly from how commercial and law-enforcement scales in the U.S. are typically selected today. Without any guidance concerning acceptable and unacceptable uses of the different accuracy classes specified, this proposal presents a potential conflict in making a decision for an appropriate weighing system for a given installation.

OWM's written comments to the Committee stated that OWM would need additional supporting data and information from the submitter of this item to be able to offer constructive feedback on the two proposals in this group that comprised the original proposal. OWM elaborated by providing the following list of information needed:

- Clarification on whether the proposal is intended to include "uncoupled-in-motion railroad weighing systems." Although the title of proposed paragraph T.N.3.6. is "Coupled-In-Motion Railroad Weighing Systems," proposed new paragraph T.N.3.6.3. Wagon Weighing references both uncoupled and coupled "wagon" weighing. If the proposal is to include uncoupled wagon weighing, the title of T.N.3.6. would need to be changed. If not, then the reference to "uncoupled wagon weighing" in T.N.3.6.3. would need to be deleted. OWM notes that if the proposal is intended to apply to uncoupled-in-motion railroad systems, the tolerances specified in the proposal far exceed the current HB 44 tolerances specified in paragraph T.N.3.7. for this same application, which requires every weighment error to be within the static maintenance tolerance.
- Results of comparison tests (using reference cars weighed as a single draft on an accurate static railroad track scale) that provide true indication of the accuracy of the Meridian system.
- The rationale for the changes proposed to footnote 3 of Table 3.
- Clarification of how the tolerance values in proposed Table T.N.3.6. are calculated for both wagon weighing and train weighing on both initial and subsequent verifications based on the criteria specified in proposed paragraph T.N.3.6.3. and T.N.3.6.4. Perhaps an example of the tolerance calculations for both wagon weighing, and train weighing would be helpful to clarify the application of these tolerances.
- A list of the different qualifying applications in which the proposed four accuracy classes of a coupled-in-motion railroad weighing system could be used.

OWM noted that while it is supportive of wanting to harmonize U.S. and international standards when it makes sense to do so, it views this proposal as an attempt to increase the allowable tolerance on individual railcars weighed coupled-in-motion to pave the way for the use of railroad weighing systems installed on continuous rail. We question

the reasonableness of increasing current HB 44 tolerances to allow for the use of less accurate commercial equipment given that existing commercial equipment is able to perform to within the current tolerances specified.

At the 2018 NCWM Annual Meeting, the Committee did not take comments during open hearings on Developing items except to grant the submitter of a Developing item (or block of Developing items) an opportunity to provide an update on the progress made to further develop the item(s) since the 2018 NCWM Interim Meeting. Mr. Richard Suiter (Richard Suiter Consulting), serving as consultant to Meridian Engineers Pty Ltd., provided an update to the Committee on this block of items. He reported Meridian is still working on these items in hopes of having a proposal developed for consideration at the 2019 NCWM Interim Meeting.

In written comments to the Committee, the SMA recommended the withdrawal of this proposal. The current standards have been in effect for years, there are a number of devices that comply with the current standards, and the SMA does not feel lowering the standard is in the best interest of the weights and measures community. In addition, the SMA feels that adding additional classes with larger tolerances would cause confusion in the marketplace.

The Committee agreed to carryover this proposal on its 2019 agenda by assigning it a developing status to provide the submitter additional time to develop the items.

During the 2019 NCWM Interim Meeting the Committee heard a presentation from Mr. Richard Suiter (Richard Suiter Consulting) representing the submitter. The presentation provided an overview of the design and operation of an in-motion railway track scale the presentation defined as a "Point Based System." The presentation showed that the system uses a strain gage-based sensing device that is mounted directly to the rail. At the conclusion, Mr. Suiter suggested that the item was ready to be assigned a voting status.

The Committee also heard comments from the SMA opposing the item as it increases the current tolerance values relative to similar types of devices as well as providing less stringent specification requirements. In view of these changes, the SMA recommended the item be withdrawn. Representatives from Systems Associates, Inc. and Schenck Process, LLC. voiced opposition to the proposal primarily due to the increase of the tolerance values. They commented that there are current systems in use today that meet existing tolerances and for this reason do not feel it is appropriate to increase tolerance values for one manufacturer.

During the committee's work session, the committee members discussed the need to include a statement related to the selection and requirements of a reference scale for use during the testing of an instrument that is only capable of dynamic weighing. The Committee revised UR.5.(b) of the original proposal (revised version shown in the Item Under Consideration) to state that the determination of the reference scale selection was within the authority of the jurisdiction having statutory authority for the system. The revised version accepted by the Committee is as shown in the Item Under Consideration. With the inclusion of these amendments to the proposal, the Committee designated the item a voting status.

At the 2019 NCWM Annual Meeting, the Committee heard comments from Mr. Suiter representing the submitter. Mr. Suiter requested the proposal be amended to delete the changes proposed to paragraphs TN.3.6., TN.3.6.1. and TN.4.6. The amended proposal would then include only changes proposed to paragraph UR.5.(b). and the addition of a new definition for "point-based railroad weighing systems" in HB 44 Appendix D. The Committee agreed to delete changes proposed to TN.3.6. and TN.3.6.1. and TN.4.6. as requested by submitter. The Committee also decided to change the status of the proposal from "Voting" to "Informational" and to seek input from the regional associations on remaining portions (UR.5.b. and the definition for point-based railroad weighing systems) of this proposal.

Regional Association Comments:

WWMA 2019 Annual Meeting: Prior to the 2019 WWMA Annual Meeting, the submitter provided a written recommendation to amend the proposed new subparagraph, UR.5.b. by adding the terminology of "point-based railroad weighing system" to that paragraph and to also include the definition in HB 44 Appendix D for "point-based railroad weighing system."

The Committee heard comments from Mr. Russ Vires (SMA) stating opposition to this item pointing out the initial proposal's increase of tolerances for this type of device. Mr. Eric Golden (Cardinal Scale) stating that this proposal

has been in the agenda for quite some time and that the submitter has amended the proposal by removing several of the elements that were included in the initial proposal. Cardinal is opposed even though that the proposal contains less changes than originally presented. Mr. Golden also requested that clarification be made of the phrase "reference scale in close proximity."

Mr. John Barton (NIST OWM) stated that the proposal has been pared down and that the user's requirement included in the current version of the proposal adds nothing since the regulatory official already possesses the authority to declare a reference scale as appropriate. Also, if the user requirement is omitted, then the definition for "point-based railroad weighing systems" is not needed.

Mr. Steve Harrington (OR) commented that considerable angst has been removed from this proposal given that many of the original changes in the proposal have been deleted.

The Committee agreed this proposal as amended by the submitter has merit and to also recommend a Voting status for the item. The Committee also recommends that this proposal's purpose be modified to only include the changes being suggested to add new subparagraph UR.5.b. and the definition for "point-based railroad weighing systems" in HB 44 Appendix D.

SWMA 2019 Annual Meeting: Russ Vires (SMA) opposed the item because he believes the current standards are fine. Dick Suiter (Richard Suiter Consulting representing Meridian Engineering) stated that Meridian Engineering withdrew this item in July and has since removed the Creep Test and Tolerance changes from the item. He also stated that he believes the item should be made into a Voting Item with the term "Point-Based" added to UR.5 B, and also the following definition of Point-Based to HB 44:

> **UR.5. (b) For coupled-in-motion Point-Based weighing systems used only for dynamic weighing, the user shall provide and alternate certified scale to be used as a reference scale. The weights and measures authority having jurisdiction over the weighing system shall determine if the reference scale provided is suitable in terms of size, capacity, minimum division, performance requirements, and the proximity to the weighing system under evaluation. The reference weight cars weighed on the reference scale may then be used for calibration and annual inspection by the jurisdiction with statutory authority for the system.**
> (Added 1990) (Amended 1992 **and 20XX**)

Tim Chesser (Arkansas) stated that he supports moving this forward as a Voting Item. Eric Golden (Cardinal Scales) pointed out that the post-July changes that Dick Suiter laid out were still included in our copy of the item on S&T p.20 Lines 4 and 5 and should have been removed.

The Committee recommends this item be moved forward as a Voting Item with the language corrected as described.

NEWMA 2019 Interim Meeting: The Committee agrees with the body and finds merit in this item, sees it as fully developed and recommends it be assigned Voting status. Dick Suiter (Richard Suiter Consulting) commented on behalf of submitter, Meridian Engineers, and provided a written statement that is included in the Appendix.

CWMA 2019 Interim Meeting: Dick Suite (Richard Suiter Consulting) provided written comments suggesting the above amendments to the item, including updating the title and purpose to reflect the removal of items from the proposal and adding the term "Point-based railroad" to UR.5. (b). We recommend the item move forward as a voting item with these amendments.

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

SCL-20.9 S.1.1.3. Zero Indication, Load Receiving Elements Separate from Weighing Elements. and Appendix D – Definitions: no load reference value

Background/Discussion:

There are many devices currently in use that, when not returned to zero, produce an inaccurate weighment. For example, a hopper scale used to weigh aluminum cans. The hoppers of these scales tend to become very sticky from residue and cans may stick to the side. When the indicator doesn't return to zero the operator will typically re-zero the scale to begin the next weighment. If the operator doesn't notice the device didn't return to zero, they may pay for the same cans more than once. If the device is re-zeroed with the can still stuck and it is knocked loose later, the customer may be paid for less material than they brought to the facility if the operator doesn't notice the indicator is below zero. If properly operated, a system utilizing a load-receiving element separate from a weighing element can be used to determine an accurate net weight.

In some cases, the load receiving element of a scale will retain materials (in the case of a hopper scale often referred to as the "heel"). This is typically a positive value but if the operator manually re-zero's the indicator and the material is subsequently cleared this can result in a negative value and should be accounted for when determining a net weight.

Regional Association Comments:

WWMA 2019 Annual Meeting: The Committee recognizes this as a new proposal and that there were no comments heard on the item during the open hearings. Due to the lack of comments regarding this proposal, the Committee does not offer any recommendation for its status.

SWMA 2019 Annual Meeting: The Committee has decided to make No Recommendation on this item.

NEWMA 2019 Interim Meeting: The Committee and the body take no position on this item as no comments were heard during open hearings.

CWMA 2019 Interim Meeting: Loren Minnich (KS) the submitter of the item requested the item be assigned a developing status to receive input on the item. Dick Suiter (Richard Suiter Consulting) suggested further clarification regarding what is a load receiving element vs. weighing element. Jason Smith (SD) agreed that there is clarification needed. We recommend the item move forward as developing.

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

SCL-20.10 S.1.2.2.2. Class I and II Scales Used in Direct Sale and S.1.2.2.3. Deviation of a "d" Resolution.

Source:

Beginning January 1, 2020 this specification will require device owners to purchase unnecessary class I or II scales and beginning January 1, 2023 it will require them to remove from use scales that are perfectly acceptable for their purpose. This will result in the removal of a great number of good scales (thousands or more) with a very high replacement value. Scales where "d" differs from "e" can be used accurately provided they are tested with proper weights, using a tolerance based on "e" but using the value of "d" for tolerance application. When this is done the value of "d" can be used in direct sales. I believe there is a misunderstanding regarding NTEP evaluation where it is believed that the value of "d" is not used during the evaluation process. This is not correct, the value of "d" is used, and devices will fail if the value of "d" is outside the applicable tolerance.

The submitter suggested that there was considerable concern that the value of "d" was being used in the direct sales of cannabis and that the rounding would result in inaccurate values. These concerns could be addressed if NTEP/NIST representatives assured those concerned that the value of "d" can be used during testing and that following successful testing the value of "d" can be used in direct sales with confidence.

Regional Association Comments:

WWMA 2019 Annual Meeting: During the open hearing session, comments were taken as a group to include items SCL-20.2, SCL-20.10, and SCL-20.11.

Mr. Steve Harrington (OR) commented he still believes there is merit in the proposed changes but suggested removing the retroactive date to allow devices now in service to remain in service. Mr. Russ Vires (SMA) provided some history of the use of both "d" and "e" for scales and that field inspectors did not have the appropriate test weight to properly test these scales to the finest resolution. While supported initially by the SMA, it was not realized that this proposal would have unintended consequences related to the jewelry industry where "d" is commonly used in weight determinations. The SMA recommends that the retroactive date be eliminated to allow manufactures additional time to change the designs on their equipment and so existing scales can continue to be used. Mr. Vires also suggested that this requirement could be formatted as a user requirement.

Mr. John Barton (NIST OWM) stated that the exclusion of jeweler's scales in this requirement could provide reason to exclude other applications and this may be a "slippery slope."

Mr. Harrington stated that he could also support the proposal formatted as a user requirement.

The Committee agrees that this proposal should be withdrawn. The Committee acknowledges paragraph S.1.2.2.2. has merit as it appears currently in HB 44 except for the non-retroactive status, becoming retroactive at a later date. The Committee will address the issue of the non-retroactive and retroactive status in item SCL-20.11.

SWMA 2019 Annual Meeting: The Committee recommends this item be Withdrawn. The Committee prefers SCL-20.11.

NEWMA 2019 Interim Meeting: The Committee and the body find merit in this item and finds it fully developed and agrees it should be assigned a voting status. Submitter. Mr. Jim Willis (NY) presented a short power point explaining the unintended consequences of 2.20.S.1.2.2.2 in 2019 HB44 for certain industries. He also stated that NY will not enforce the current language in HB44 as it puts undue burden on those that have used NTEP certified scales for decades and now will be forced to buy new devices. Mr. John McGuire (NJ) asked what the difference is between SCL-20.10 and SCL-20.11? Mr. Steve Timar (NY) says the exception in 20.11 has a carve out just for jewelry scales, but submitter wants language to return to 2017 HB44. Mr. John McGuire (NJ) supports submitters position.

CWMA 2019 Interim Meeting: Loren Minnich (KS) commented that the item should move forward as a voting item with the above amendment. We recommend the item move forward as a voting item with the above amendment.

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

SCL-20.11 S.1.2.2.2. Class I and II Scales Used in Direct Sales.

Background/Discussion:

Specification S.1.2.2.2. Class I and II Scales used in Direct Sales was added in 2017 and is going into effect for new scales going on the market in January 2020 with a retroactive date of January 2023. S.1.2.2.2. came about due to the concern that cannabis scale users may not be properly trained, and a direct sale transaction must be based on the "e" verification scale division and not the differentiated displayed scale division "d". The unintended consequence is that users in the jewelry business that are knowledgeable regarding the use and application of these higher precision devices see no benefit to this requirement, and are concerned they would need to replace many of their scales by 2023 with more expensive models, which would be an unnecessary burden on them. States have currently established rules and regulations regarding the jewelry business and the proposed change will enable the jewelers' scale owner and the regulators to continue to operate as they have in the past.

An unintended consequence is there are other applications, such as jewelers' scales, where Class I and II scales equipped with auxiliary reading means ("e" ≠ "d") are used by experienced operators, and it is not clear whether the use of these scales will be permitted in direct sales or not. Discussions with several states show there may be confusion in how this new specification is interpreted as it relates to these jeweler's scales.

There is also a concern that the retroactive date of January 2023 will be a burden for those in the jewelry business if they must replace perfectly good scales currently in use.

The addition of S.1.2.2.2. in 2017 has created confusion in the jewelry market whether this change applies to jewelers' scales or not, and which jewelry sales are considered direct sales and which are not. Jewelers' scale owners have been using these scales for years and have worked closely with local regulators on the proper use of these scales. The proposed change will clarify that this specification is not applicable to jewelers' scales and that it does apply to the other markets it was intended for.

The retroactive date of January 2023 should be eliminated so that existing scales can continue to be used, and not place an undue financial burden on scale owners to replace them.

Regional Association Comments:

WWMA 2019 Annual Meeting: Mr. Steve Harrington (OR) commenting that he still believes there is merit in the proposed changes but suggested removing the retroactive date to allow devices now in service to remain in service. Mr. Russ Vires (SMA) provided some history of the use of both "d" and "e" for scales and that field inspectors did not have the appropriate test weight to properly test these scales to the finest resolution. While supported initially by the SMA, it was not realized that this proposal would have unintended consequences related to the jewelry industry where "d" is commonly used in weight determinations. The SMA recommends that the retroactive date be eliminated to allow manufactures additional time to change the designs on their equipment and so existing scales can continue to be used. Mr. Vires also suggested that this requirement could be formatted as a user requirement.

Mr. John Barton (NIST OWM) stated that the exclusion of jeweler's scales in this requirement could provide reason to exclude other applications and this may be a "slippery slope."

Mr. Harrington stated that he could also support the proposal formatted as a user requirement.

The Committee recommends this item be given a voting status as amended in the proposal including the exception for jeweler's scales. The Committee recommends to further add an exception for grain test scales used in USDA applications as shown.

> ***S.1.2.2.2. Class I and II Scales Used in Direct Sales.*** – ***Except for jewelers' scales and grain test scales used in USDA applications, ~~W~~w****hen accuracy Class I and II scales are used in direct sale applications, the value of the displayed division "d" shall be equal to the value of the verification scale interval "e.*
>
> *[Nonretroactive as of January 1, 202**~~0~~3**; **~~to become retroactive as of January 1, 2023~~**]*

SWMA 2019 Annual Meeting: Russ Vires (Mettler Toledo, Submitter) suggested the following change.

> ***S.1.2.2.2. Class I and II Scales Used in Direct Sales.*** – ***Except for jewelers' scales and grain test scales used in USDA applications, W****when accuracy Class I and II scales are used in direct sale applications, the value of the displayed division "d" shall be equal to the value of the verification scale interval "e".*
>
> *[Nonretroactive as of January 1, 202**~~0~~3**; **~~to become retroactive as of January 1, 2023~~**]*

The Committee recommends moving this item forward as a Voting Item with the proposed changes.

NEWMA 2019 Interim Meeting: The Committee and the body agree that this item is redundant and would cause a special carve out for devices used in certain industries. The Committee believes this item should be withdrawn and urges the submitter to work with the submitter of SCL-20.10. Mr. Ethan Brogren (Westchester County, NY), Mr. John McGuire (NJ), Mr. Jim Willis (NY) and Mr. Marc Paquette (VT) all voiced concerns about the redundancy of

the item. Mr. Dick Suiter (Richard Suiter Consulting) commented that the Southern Weights and Measures Association recommended also including grain test scales in this proposal.

CWMA 2019 Interim Meeting: Loren Minnich, KS, commented that it is inappropriate to make this exemption and this item should be withdrawn. We recommend the item be withdrawn.

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

SCL-20.12 Multiple Sections to Add Vehicle Weigh-in-Motion to the Code and Appendix D – Definitions; vehicle scale and weigh-in-motion vehicle scale.

Background/Discussion:

There has been a lot of work done to include Commercial Weigh-in-Motion into Handbook 44 over the past few years. Mettler Toledo has been a supporter of adding WIM code into HB44, however, the axle weighing scale proposed has failed to demonstrate that it can meet the requirements and tolerances associated with commercial vehicle weighing.

There is a growing need in the market to provide commercial vehicle weighing transactions faster than can currently be done by static weighing. We also know weigh-in-motion vehicle scales can provide these faster transactions and meet the requirements to provide commercially accurate results dynamically when the complete vehicle is on the scale. For these reasons, Mettler-Toledo is submitting this proposal to amend Handbook 44 to include single draft WIM vehicle scales.

Those in favor of axle weighing scales may be opposed to WIM scales being included in UR.3.3. Single-Draft Vehicle Weighing. However, until those devices can demonstrate they can meet the Handbook 44 Class IIIL requirements and also provide adequate test procedures to verify the device can perform under all conditions of anticipated use, they should not be permitted to be used as commercial devices. Mettler-Toledo can demonstrate a single draft WIM vehicle scale can meet the HB44 requirements and we will work with the conference to refine the test procedures as needed in our proposal.

Regional Association Comments:

WWMA 2019 Annual Meeting: Mr. Russ Vires (Mettler Toledo) commented as the submitter of the item that input is requested from the regional associations, regulators, and other sources on the changes being proposed. Mr. Vires stated that he believes the item is fully developed and requested that it be assigned as a Voting item. Mr. John Barton (NIST) stated that OWM has not had enough opportunity to review this item fully but that it is encouraging to note that the submitter is offering others the opportunity to observe the submitter's device being tested to provide evidence that it will meet Class IIIL tolerances. Mr. Eric Golden (Cardinal Scale) stated that as a member he has experienced the frustration in the past 18 months with the existing WIM TG addressing item SCL-16.1. Mr. Golden stated that Cardinal could support this proposal as a Developing item with some reservations.

The Committee agrees the item has merit and also that the item be given a Developing status. The Committee notes that the submitter has stated there is an opportunity for having members of the NCWM, NIST, and/or regulatory officials to witness the operation of the systems referenced in this proposal thus providing evidence the systems will meet current Class IIIL tolerances.

SWMA 2019 Annual Meeting: Tim Chesser (Arkansas) recommended this item be given an Assigned status. Russ Vires (Mettler Toledo) stated that he did not support an Assigned status and is willing to demonstrate the capabilities of the device by the 2020 NCWM Interim Meeting. He believes the item is well developed, but would rather the item be recommended as Developing back to Mettler Toledo, the submitter. Eric Golden (Cardinal Scales) asked how multi-platform scales would be considered moving forward, and that he supports single draft weighing. Dick Suiter (WIM Task Group) stated that this item conflicts with the task group's proposal if single draft weighing became the only allowable method. He also stated that the task group wants to remove the single draft requirement for WIM Vehicle Scales.

The Committee recommends this item be Assigned to the WIM Task Group.

NEWMA 2019 Interim Meeting: The Committee and the body agree that this item has merit and should be given an assigned status. During open hearings, Mr. Dick Suiter (Richard Suiter Consulting) commented that as a WIM member, recommend the item be assigned. He explained that this proposal is different than SCL-16.1 because it proposes using a single draft with a full-length truck scale. Mr. John McGuire (NJ) and Mr. Jim Willis (NY) agree with this position

CWMA 2019 Interim Meeting: Eric Golden, Cardinal Scale, commented that they support the single draft requirement for WIM vehicle scales and this item should be separate from SCL-19.2. Dick Suiter, Richard Suiter Consulting, commented that other regions recommended assigning the item and that the WIM TG can develop both items. Charlie Stutesman, KS commented that SCL-19.2. has been held back by disagreement over test procedures and this item shouldn't be assigned to the WIM TG. Jason Smith, SD, commented that the WIM TG was developing code for all devices and could consider both. We recommend the item be assigned to the WIM TG so that group can determine how these items move forward.

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

SCL-20.13 N.1.5. Discrimination Test.

Background/Discussion:

The long-accepted procedures for testing discrimination on digital electronic scales in which e = d, specify the use of a test load equaling 1.4 e to change the displayed indication by 2 e when applied or removed from the weighing/load-receiving element at a starting reference that is just outside the zone-of-uncertainty between 2 consecutive increments. When e = 1 mg or 2 mg on a Class I or II scale, a 1.4 e test load requires the use of decimal milligram test weights to develop the test loads necessary to test discrimination. Field officials are not likely to possess field standards this small; nor do some of the NTEP labs possess them.

At the 2019 NTEP Lab Meeting, the weighing evaluators present at the meeting reported they believe it very questionable that a field test of discrimination using such small test loads could be performed and there be confidence in the outcome of the results of those tests. Additionally, the evaluators were not aware of any weights and measures jurisdiction that has issued decimal milligram field standard test weights to field staff. Some of the NTEP weighing evaluators reported they too do not possess test standards this small. Consequently, the NTEP evaluators agreed during the 2019 NTEP Lab Meeting to draft a 2019 Weighing Sector proposal to amend NCWM Publication 14 DES to eliminate the application of the discrimination test on scales in which the value of e = d and is less than 5 mg. The NTEP evaluators also concluded during the 2019 NTEP Lab Meeting, HB 44 Scales Code paragraph N.1.5. would also need to be amended because it specifies a discrimination test be performed on all automatic indicating scales.

During the 2019 NTEP Weighing Sector Meeting, the Sector agreed to recommend (in Item 5 of its 2019 agenda) adding text to NCWM Publication 14 DES making clear the discrimination test for type evaluation is only intended to apply to scales in which the value of e = d and is greater than or equal to (≥) 5 mg. The following changes were agreed to and recommended by the Sector:

Amend the title of Sub-Section 44.2 (NCWM Publication 14 DES) as follows:

> 44.2. Discrimination Test **(Scales in which the value of e = d and is ≥ 5 mg)**. The following tests shall be performed within 10 e of zero and at the maximum test load.
> 44.2.1. …

Because NTEP evaluates weighing and measuring equipment to verify conformance with NIST Handbook 44 requirements, members of the Sector concluded Scales Code paragraph N.1.5. will first need to be amended as proposed in part 16. of this form to be able to make the changes recommended to Sub-Section 44.2. of NCWM Publication 14 DES.

A similar exception is provided in OIML R 76 where it is specified in clause 3.8.2.2. Digital Indication, the discrimination procedures apply only to instruments with $d \geq 5$ *mg*. Consequently, amending Scales Code paragraph S.1.5. as proposed would improve harmonization of HB 44 and OIML R-76 requirements.

Participants of the 2019 NTEP Lab Meeting and 2019 Weighing Sector Meeting were not aware of any opposition to the proposed changes; both groups reporting at those meetings a belief that discrimination testing is not currently being performed on the scales for which the proposal is directed.

Regional Association Comments:
WWMA 2019 Annual Meeting: The item was not addressed by this region.

SWMA 2019 Annual Meeting: The item was not addressed by this region.

NEWMA 2019 Annual Meeting: The item was not addressed by this region.

CWMA 2019 Annual Meeting: Several regulators opposed creating an exemption for these scales and supported withdrawing the item. We recommend the item be withdrawn.

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

ABW – AUTOMATIC BULK WEIGHING SYSTEMS

ABW-16.1 D A. Application, S Specifications, N. Notes, UR. User Requirements and Appendix D – Definitions: automatic bulk weighing system.

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

Mr. Doug Musick
Kansas Department of Agriculture
(785) 564-6681, dmusick@ks.gov

Note: The updated version provided in 2016 and 2017 is that which is shown in Item under Consideration for this item. To view previous versions of the proposal, refer to the committee's 2016 and 2017 Final Reports.

The following rationale was offered by the submitter of this item for proposing changes to the HB 44 ABWS Code:

- There are many systems in use that don't meet the definition for a "scale" or an "ABWS" 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 ABWSs.

- 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 tub 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 replaced 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 more descriptive terms such as "downstream storage devices" to allow for all potential 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 cannot touch the weigh hopper when it reaches its' maximum potential height 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 weighing errors.

The Committee received updates on this item by its submitter, Mr. Doug Musick (KS) at the NCWM Interim and Annual Meetings of 2016 and 2017. The Committee agreed at each these meetings to maintain the Developing status of the item to provide Mr. Musick the opportunity to fully develop the proposal.

At the 2018 NCWM Interim Meeting the Committee received comments from Mr. Doug Musick (KS), submitter of the item. Mr. Musick asked the Committee to keep the item in a Developing status as there are changes being made to the item based on comments and feedback received from recent regional meetings. During the Committee's work session, it was agreed to keep the item Developing as requested by the submitter.

The Committee did not take comments during open hearings on Developing items at the 2018 NCWM Annual Meeting except to grant the submitter of a Developing item an opportunity to provide an update on the progress made

to further develop the item(s) since the 2018 NCWM Interim Meeting. Mr. Loren Minnich (KS) gave an update on the Developing item to the Committee. Mr. Minnich stated that he or Mr. Doug Musick (KS) plan on giving presentations at 2018 regional meetings to provide more detail on the item. Kansas hopes to have this item fully developed so it can be presented for vote next year.

OWM provided the following written recommendations and comments to this item as feedback to the submitter and as part of its analysis of the S&T Committee's 2018 agenda items:

- The changes proposed in ABW-3, ABW-4, and OTH-6 are all related attempts to help clarify and make it easier for field officials to determine the proper HB 44 code to apply to some newer automatic weighing systems that have been introduced into the commercial arena. OWM is unable to envision, based upon its review of these three proposals, how the proposals, whether considered individually, or combined and considered as a group, will accomplish this intended outcome. Addressing these issues in a piecemeal fashion may actually result in more confusion.

- With respect to this particular item, OWM reiterates its comments included in the analysis it provided to the Committee at the January 2018 Interim Meeting. The proposed changes to the Automatic Bulk Weighing Systems (ABWS) Code would expand its application to include some newer automatic weighing systems that currently fail to meet the application of the ABWS Code (or the current HB 44 definition of an ABWS). OWM is not convinced this is a technically sound appropriate approach.

- The current ABWS Code applies to systems that automatically weigh a single commodity in successive drafts; yet we believe it was the submitter's intent in drafting some of the proposed changes that the code also apply to systems that automatically weigh more than one commodity at a time in successive drafts. For example, some seed treatment systems can be programmed to weigh multiple drafts of the same recipe, which, oftentimes, is made up of different ingredients (commodities) that get mixed together to form the treatment for a particular seed type. The various recipes to be weighed by a system can include not only different ingredients, but also different amounts of those ingredients, both of which can affect the price charged to customers. Expanding the application of the ABWS Code to address such systems may cause unnecessary confusion. For this reason, OWM prefers maintaining the current ABWS Code as is. Perhaps a better approach to addressing these systems and the resulting gaps in HB 44 requirements would be to form a small group to further study such systems and recommend Handbook 44 changes, possibly including consideration of a separate code to address these and other types of dynamic weighing systems.

The Committee agreed to carryover this item on its 2019 agenda in a Developing status and looks forward to being able to consider a final completed version.

At the 2019 NCWM Interim Meeting, Mr. Doug Musick (KS), submitter of the item, requested the Committee designate this item either "Developing" or "Informational" given the written comments the Committee received from CompuWeigh Company and NIST OWM in advance of the 2019 Interim Meeting. Mr. Musick reported he believes this item has merit. Automatic bulk weighing systems can provide greater accuracy in weighing bulk commodities that don't flow well when fed into or discharged from a hopper. The number of automatic weighing systems in the commercial marketplace is increasing and some of the more current systems don't seem to fit the application section of any particular HB 44 code. This "newer" equipment needs to be addressed somewhere in HB 44. Designating this item as "developing" or "informational" will provide time needed to address the concerns noted in the comments provided by CompuWeigh Company and NIST OWM.

In written comments and recommendations provided to the Committee in advance of the 2019 NCWM Interim Meeting, NIST OWM provided the Committee the following points concerning this item:

- OWM views the changes proposed to paragraph A.1. as expanding the scope of the current Automatic Bulk Weighing Systems Code to encompass types of systems not previously considered an ABWS.

- While OWM agrees with the concept of updating the current code to pave the way for its application to newer automated weighing systems, OWM believes the current draft proposal is not sufficiently developed enough to be considered for adoption.

- Critical parts of the Handbook 44, Appendix D definition of "automatic bulk weighing system" and paragraph A.1. of the ABWS Code that are proposed for deletion provide the unique and distinguishing operational features of these systems and are therefore, very significant in identifying ABWS and are imperative for determining the application of the correct HB 44 code.

- "Loaded weight value" (paragraph S.1.8.), "weighing process" (paragraph S.10.), and "weighment" (paragraphs S.1.8., S.1.9., and S.1.10) in this proposal are ambiguous terms that need to be clearly defined.

- The changes proposed to paragraph S.3.3.(a) and (b) need additional work. For example, it is important to specify in (a) that product flow to the load-receiving element must automatically stop rather than be stopped. Also, the terminology "other equipment" needs better clarification in the first sentence proposed for sub-paragraph (b). Additional language is needed to clarify the proper application of these two subparagraphs.

To view all of OWM's comments and recommendations pertaining to this item, refer to OWM's analysis of the different items on the S&T Committee's agenda posted on the NCWM website for the 2019 NCWM Interim Meeting.

At the 2019 NCWM Annual Meeting the Committee was told by the submitter that there was no new information to update although, Mr. Loren Minnich would be working to further develop this item for the state of Kansas. The Committee agreed to maintain this proposal as a Developing Item.

Regional Association Comments:

WWMA 2019 Annual Meeting: During the open hearing session, the Committee heard comments from Mr. Russ Vires (SMA) have no opinion at this time. Mr. John Barton (NIST) stated that the submitter proposal to modify the ABWS Code by introducing terminology that reflects the newer technology in use today however, he believes that there is too much focus being given to "automation" and not enough focus on the unique and specific characteristics of ABWS devices. Also that by removing the description of ABWS from the Applications Section of the Code, this proposal will widen the scope to include systems not intended to be covered under the ABWS Code.

The Committee agreed to recommend this item be withdrawn. The Committee recognizes that there have been no changes to the proposal since the last cycle of hearings.

SWMA 2019 Annual Meeting: Russ Vires (SMA) stated SMA had no position on this item at this time. The Committee decided to make No Recommendation on this item.

NEWMA 2019 Interim Meeting: The Committee and the body agree with comments made in the Western Weights and Measures Association report that this item should be withdrawn as no changes or additional information has been provided since 2016. No comment was heard during open hearing.

CWMA 2019 Interim Meeting: Loren Minnich, KS, commented that work is continuing on this item to address concerns that have been raised and would like it to remain developing. We recommend the item remain developing.

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

WIM – WEIGH-IN-MOTION SYSTEMS USED FOR VEHICLE ENFORCEMENT SCREENING TENTATIVE CODE

WIM-19.1 D Title of Tentative Code, S.1.7.1. Values to be Recorded., S.4.1. Designation of Accuracy., N.1. Test Procedures, T.2. Tolerance Values for Accuracy ~~Class A~~ Classes., UR.1.1. General, Table 1. Typical Class or Type of Device for Weighing Applications.

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

Mr. Jon Arnold
Intercomp Company
(763) 476-2613, jona@intercompcompany.com

Vehicle and axle weight screening has both safety and enforcement ramifications. Certified WIM systems for vehicle screening for enforcement decreases queues at static weigh stations with cost and efficiency benefits and provides certified WIM system for identifying cause for ensuing static weighing of potential overweight commercial vehicles.

Further, OSHA requires certified systems for establishing weights (vehicle and cargo) prior to lifting cargo from vehicles, and WIM systems are capable of providing weights at non-legal for trade tolerances, but currently are not capable of being certified.

The original tentative code was just for vehicle screening for enforcement. The proposed code widens scope of use and suggests additional accuracy classes as was originally planned. Modifying 2.25 is more efficient than suggesting adding an entirely new section (ex. 2.26) with significant overlap with 2.25.

OWM personnel were unable to attend the 2019 NCWM Interim Meeting because the Department of Commerce was part of the Federal Government that was closed as part of the partial government shutdown in early 2019 due to a lack of appropriations. In written analysis shared with the Committee in advance of the Interim Meeting, OWM provided the following with respect to this item:

OWM points out that the changes being recommended in this proposal if adopted would set a precedent where the scope of NIST Handbook 44 (as described in the Introduction – sections A. and F. and in the General Code, paragraph G-A.1.) would expand to also apply to many devices that are used in non-commercial applications. If it is the intent of the submitter to create a means by which NIST Handbook 44 could be applied to a specific category of devices or specific application of a device, OWM encourages the submitter to identify that objective in detail as part of this proposal.

OWM recognizes that many industry officials (and others) wanting to establish a quality assurance program for weighing or measuring devices used for inventory or production control, collection of operational data, or other non-commercial purposes will often use the requirements and procedures outlined in NIST Handbook 44 to establish guidelines however, the intended application is for those devices used in commercial transactions, law enforcement, or collection of statistical information by government agencies.

OWM believes that to expand the application of NIST Handbook 44 to devices used in applications other than those listed above will lead to confusion and place an even greater burden on weights and measures officials, many of which are severely challenged to fulfill their current obligations for the regulation of commercially-used devices. OWM believes that the principal reason for regulation of commercial devices is to ensure correct and fair measurement/weighment and thereby protect buyers and sellers of commodities.

OWM believes this item should be returned to the submitter for additional development and clarification.

During the 2019 Interim Meeting open hearings, the Committee heard comments from Mr. Russ Vires speaking on behalf of the SMA. Mr. Vires stated that the SMA has no position on this item but looks forward to analysis. The submitter of the item, Mr. John Arnold (Intercomp) stated that the item should be developing. Intercomp plans on adding more data. During the committee's work session, the members agreed that this item should be assigned a developing status.

During the 2019 NCWM Annual Meeting, the Committee heard no additional comments on this item. The Committee agreed to retain the Developing status on this item.

Regional Association Comments:

WWMA 2019 Annual Meeting: Mr. Russ Vires (SMA) stated that the SMA takes no position on this item and looks forward to more input from the submitter. Mr. Eric Golden (Cardinal Scale) stated that he has discussed the item with the submitter. He stated that the submitter seeks to develop a standard to be used for scales used in shipping ports to satisfy requirements established by the Maritime regulation SOLAS (Safety of Life at Sea) and OSHA (Occupational Safety and Health Administration). He does not support the tolerances proposed stating that they are excessive. Mr. Golden also stated that he does support the overall concept and the efforts of the submitter.

The Committee recommended this item be withdrawn given that the proposal seeks to include requirements for non-commercial weighing devices and that this approach could possibly increase the scope of NIST HB 44 to an excessive level.

SWMA 2019 Annual Meeting: Russ Vires (SMA) stated that SMA had no position on this item at this time. Diane Lee (NIST) stated that this item sets a precedent expanding the scope of Handbook 44 beyond commercial applications.

The Committee recommends this item be Withdrawn, based on it being in conflict with Hand Book 44 Introduction Sections A and F, and General Code Paragraph G.A.1 which stated that the code only applies to commercial devices. The Committee doesn't want to open the door to approval of any other non-commercial devices.

NEWMA 2019 Interim Meeting: The Committee and the body agree that this item be withdrawn. During open hearing, Mr. Dick Suiter (Richard Suiter Consulting) commented that opposition to this item is primarily due to the use of the term "non-commercial" and HB44 deals with commercial device applications.

CWMA 2019 Interim Meeting: Charlie Stutesman, KS, commented that this item is not necessary, and that each jurisdiction can determine how to properly evaluate devices used in this application to satisfy OSHA requirements. We recommend the item be withdrawn.

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

BLOCK 1 ITEMS (B1) TERMINOLOGY FOR TESTING STANDARDS (VERIFICATION STANDARDS, FIELD STANDARDS, TRANSFER STANDARDS, FIELD REFERENCE STANDARDS, ETC.,) TOLERANCES ON TESTS WHEN TRANSFER STANDARDS ARE USED, MINIMUM QUANTITY FOR FIELD REFERENCE STANDARD METER TESTS

GEN-19.1 A G-T.5. Tolerances on Tests When Transfer Standards are Used., Appendix D – Definitions: standards, field., ~~transfer standard.~~ and standard, transfer.
B1: SCL-18.1 A N.2. Verification (Testing) Standards
B1: ABW-18.1 A N.2. Verification (Testing) Standards
B1: AWS-18.1 A N.1.3. Verification (Testing) Standards, N.3.1. Official Tests, UR.4. Testing Standards
B1: CLM-18.1 A N.3.2. Transfer Standard Test and T.3. On Tests Using Transfer Standards
B1: CDL-18.1 A N.3.2. Transfer Standard Test, T.3. On Tests Using Transfer Standards
B1: HGM-18.1 A N.4.1. Master Meter (Transfer) Standard Test, T.4. Tolerance Application on Test Using Transfer Standard Test Method
B1: GMM-18.1 A 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. Tolerances1
B1: LVS-18.1 A N.2. Testing Standards
B1: OTH-18.1 A Appendix A: Fundamental Considerations, 3.2. Tolerances for Standards, 3.3. Accuracy of Standards
B1: OTH-18.2 A Appendix D – Definitions: fifth-wheel, official grain samples, transfer standard and Standard, Field
B1: CLM-18.2 A N.3.2. Transfer Standard Test and T.3. On Tests Using Transfer Standards
B1: CDL-18.2 A N.3.2. Transfer Standard Test and T.3. On Tests Using Transfer Standards
B1: HGM-18.2 A N.4.1. Master Meter (Transfer) Standard Test and T.4. Tolerance Application on Test Using Transfer Standard Test Method
B1: OTH-18.3 A Appendix D – Definitions: field reference standard meter and ~~transfer standard~~
B1: LPG-15.1 A N.3. Test Drafts.
B1: MFM-15.1 A N.3. Test Drafts.

Background/Discussion:
These items have been assigned to the Field Standards Task Group for further development. For more information or to provide comment, please contact:

Mr. Jason Glass, Task Group Chair
Kentucky Department of Agriculture
(502) 573-0282, jason.glass@ky.gov

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.

During the 2018 NCWM Interim Meeting opening hearings, the Committee heard comments on the proposal (then identified as Block 4) and agreed to recommend that the entire block of items move forward as Developing. The Committee also concluded that all of the items listed at that time as Block 5 items, as well as LPG-4, and MFM-2 are related to the Block 4 items due to terminology.

The Committee received written comments on all items in Block 4 and Block 5, as well as LPG-4 and MFM-2 emphasizing the need for there to be more study and discussion of the issues to assess the ramifications of all the proposed changes. The Committee also received written comments from the SMA that it looks forward to further information on these items and stating that it is important to be consistent in our use of terms across multiple sections of Handbook 44. The Committee agreed to carryover this group of items on its 2019 agenda to allow for further discussion and development of these proposals.

At the 2019 NCWM Interim Meeting the S&T Committee decided to combine the items on the agenda dealing with the issue of transfer standard (including items already combined into blocks) into one block. Block 1 (New) of the Interim Meeting report now includes Gen-3, Block 1 (original items from the 2019 interim agenda that appeared under Block 1), Block 2, LPG-3 and MFM-5, which were all separate items and blocks of items on the S&T Committee's 2019 Interim Meeting agenda (NCWM Publication 15). Agenda items Gen-3, Block 1, Block 2, LPG-3 and MFM-5 are listed separately on the Interim agenda with a note added beneath each individual item referring the reader to the New B1 items. All items under this New B1 have retained the same numbering system for ease in referring to the appendix for discussion on each item.

During the 2019 NCWM Annual Meeting, the Committee heard from Mr. Brett Gurney (NCWM Chairman) regarding the formation of a Task Group assigned to further develop this block proposal. The TG is charged with providing definitions for various types of standards (transfer, field, reference, etc.) as well as the criteria to be met by these types of standards. The completion date given to the TG is July 2021. The Committee agreed to the Assigned status for this block of items and looks forward to hearing updates from the TG.

Regional Association Comments:

WWMA 2019 Annual Meeting: Mr. Russ Vires (SMA) stated that SMA supports the proposal as it related to the items addressing scale requirements and would also recommend the use of uniform terminology in the proposed changes.

Mr. Kurt Floren (L.A. County, CA) stated that this issue should be addressed from a metrologist's perspective. Mr. Floren also stated that if there was a challenge to whether mass field standards are tested under all possible environmental conditions there may be no substantial evidence that this procedure is followed.

Committee agrees to recommend that the Assigned status is maintained and looks forward to the work in progress by the TG.

SWMA 2019 Annual Meeting: Russ Vires (SMA) stated that he supports this item as it pertains to SCL 18.1, ABW 18.1, and ABS 18.1. Diane Lee (NIST) provided guidance based on last year's comments. This item is already assigned to a task group.

NEWMA 2019 Interim Meeting: The Committee and body agree that this item should be assigned. During open hearings, Mr. John McGuire (NJ) asked if this had been assigned yet. Mr. Dick Suiter (Richard Suiter Consulting) indicated that it has been marked as assigned to a TG and the TG is gathering members in order to be working by January.

CWMA 2019 Interim Meeting: Greg VanderPlaats (MN) commented that the task group has not met. We recommend the item remained assigned.

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

LMD – LIQUID MEASURING DEVICES

LMD-19.1 I UR.4.2. Security for Retail Motor-Fuel Devices.

Background/Discussion:

Additional information can be found in the 2018 NCWM Annual Meeting Report.

A significant potential financial impact to consumers and credit issuing companies has been recognized by weights & measures jurisdictions and prompts the need to offer more protection to both buyer and seller in these transactions. The current design of these devices offers little to no barrier to fraud through theft of credit information. A general belief is that the current design of retail motor-fuel dispensers (RMFDs), in most cases, already violates G.S.2. by facilitating easy access to allow installation of these fraudulent card reading devices. Therefore, some NCWM members are advocating stronger means to 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 recognized as a nationwide problem that causes millions of dollars in fraudulent charges to consumers, device owners, and banking institutions each year. One approach to mitigate the detrimental effect on consumers is to implement upgraded security measures on the weighing and measuring devices that fall within the guidelines of HB 44.

One possible opposing argument to this proposal 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.

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).

During the 2018 NCWM Interim Meeting, the Committee heard testimony regarding the installation of fraudulent credit card reading devices on retail motor fuel dispensers and the resulting millions of dollars in fraudulent charges to consumers, device owners and banking institutions each year. In general, testimony provided to the Committee acknowledged the problem presented by the illegal use of “skimmers” however, there was not a consensus as to whether or not this is an issue to be addressed by weights and measures officials.

The Committee agreed to make this an "Assigned" item and requesting the formation of a Task Group (TG) to address this issue. The Committee identified stakeholders as likely members of such a task group as individuals from convenience store associations, meter manufacturers, retailers, petroleum marketer's association, weights and measures regulators (one from each region), and the NIST Office of Weights and Measures.

At the 2018 NCWM Annual Meeting the Committee received an update on this item from the Chairman of the NCWM Skimmer Task Group (TG), Mr. Hal Prince (FL). Mr. Prince reported work is ongoing on this item and much of the TG discussion has revolved around two key questions:

1. Is this a weights and measures issue that NCWM should take on?

2. If so, does weights and measures have the authority to require manufacturers and users of commercial weighing and measuring equipment to take whatever steps needed to ensure such equipment prevents unauthorized access to non-metrological changes to the equipment?

Mr. Prince further reported that members of the TG were recently surveyed and asked these questions, but results are not yet available. It is hoped more information will be available to report at the next (2019) NCWM Interim Meeting. See the S&T Committee 2018 Final Report for additional details.

During the 2019 NCWM Interim Meeting, the Skimmer Task Group presented the Committee new language developed to address issues of fraud due to skimmer technology. The Skimmer TG's revised proposal would add a new User Requirement paragraph, UR.4.2., to the Liquid Measuring Device Code in NIST Handbook 44 and eliminate the original proposed paragraphs G-A.1. and G-S.2. in the General Code of NIST Handbook 44.

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).

During the 2019 Interim Meeting open hearings, the NCWM S&T Committee heard comments to agenda item GEN-1 and the Skimmer Task Group provided an update of their activities and actions. The comments heard during the open hearing and Skimmer Task Group updates and actions are summarized below:

- From a polling of its members, the Skimmer Task Group determined that the issue was within weights and measures purview by a vote of 11-2. As such, the task group drafted a user's requirement during their meetings to replace paragraphs G-A.1. and G-S.2. with paragraph UR 4.2. Security for RFMDs to the Liquid Measuring Device Code in NIST Handbook 44;

- Questions were raised whether this revised proposal was intended to be retroactive or nonretroactive. The TG Chair, Mr. Hal Prince (FL) stated that a determination has not been made but it would be a decision to be made by the TG. During the NCWM S&T Committee work session, the members agreed that this item should be given an Informational status to allow for full vetting of the new proposal by the NCWM membership.

At the 2019 NCWM Annual Meeting, the Committee heard from Mr. Hal Prince providing an update and stating that during the period this item had been an Assigned item, the TG met routinely until the proposal was made Informational by the Committee at the 2019 Interim Meeting. He noted that the original proposal had been revised to only recommend a new user's requirement be added to the NIST Handbook 44 Liquid Measuring Devices Code. Mr. Prince also recommended that the Committee maintain the item's current Informational status for at least one additional cycle to ensure that it is fully vetted and to possibly be presented in community outreach programs to gain feedback from additional stakeholders. The Committee agreed to maintain Informational status.

Regional Association Comments:
WWMA 2019 Annual Meeting: Mr. Clark Cooney (CA) supported this item as did Mr. Brent Price (Gilbarco).

The Committee acknowledges this item is an Informational item and that during the July 2019 NCWM Annual meeting the submitters recommended this item be vetted further during the next cycle.

SWMA 2019 Annual Meeting: Hal Prince (Florida, Skimmer Task Group) stated that he and the Task Group believe the item is fully developed and they support this item being made a Voting Item. Tim Chesser (Arkansas), Brent Price (Gilbarco) and Ed Coleman (Tennessee) also supported moving the item to a Voting Item.

The Committee agreed that this item is fully developed and recommends making it a Voting Item.

NEWMA 2019 Interim Meeting: The Committee and the body agree that this item should have a voting status. During open hearings, Mr. John McGuire (NJ) offered support of the item while, Mr. Jim Willis (NY) comments that NY feel this item does not belong in HB44 but supports actions to thwart fraud. Mr. Marc Paquette (VT) agrees with NY and has no objection moving this item forward for voting.

CWMA 2019 Interim Meeting: Several regulators commented in support of moving the item forward as voting. We recommend the item move forward as voting.

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

LMD-20.1 Table S.2.2. Categories of Devices and Methods of Sealing

Background/Discussion:

The amount of information required for a category 3 log is extensive (5 items x 1000 events). That is a lot of printing, especially using a standard receipt printer. With today's technology leaning towards the ability to perform remote downloads and configurations, we need a practical approach that allows this technology to move forward while still providing the means to document changes to sealable parameters that have taken place in the device. In most cases, the printer inside of the dispenser is not directly connected to the dispenser electronics and thus printing on the internal printer is at best difficult, and in most cases, not possible. The ability to provide an electronic file in lieu of a printed copy can also enhance the ability to organize the information contained in the log to make it easier to present to the official. The exact format and electronic transportation method is open to discussion.

The submitter noted that Officials do not carry devices capable of reading an electronic file or are not permitted to access such files.

Regional Association Comments:

WWMA 2019 Annual Meeting: No comments were heard during the open hearing session on this item. The Committee agreed that this item has merit and that it is fully developed. The Committee also recommends that the item be given a Voting status.

SWMA 2019 Annual Meeting: Brent Price (Gilbarco) stated that he supports the item because it would allow an electronic log to replace the requirement for physical copies. The Committee recommends this item as a Voting Item.

NEWMA 2019 Interim Meeting: The Committee and the body agree to move this item to voting status. During open hearings, Mr. Jim Willis (NY) voiced strong support for this item, indicating the need to recognize newer capabilities of electronic audit trail technology.

CWMA 2019 Interim Meeting: Charlie Stutesman (KS) commented that the item has merit, but he is concerned with how an inspector would receive the information electronically and would like to see the item move forward as developing. We recommend the item move forward as developing.

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

LMD-20.2 S.1.6.10. Automatic Timeout – Pay-at-pump Retail Motor Fuel Devices.

Background/Discussion:
At certain large locations, the existing two-minute timeout is insufficient and frustrating for some customers. In addition to facility size, customer needs also often justify the need for a longer timeout. For instance, customers with limited mobility, customers tending to children or elderly, and customers who opt to utilize restroom facilities before dispensing their fuel have expressed a desire for additional time.

The need for an automatic timeout is valid to ensure that a customer's purchased fuel is not dispensed to another customer or subject to theft, however, additional time is needed in certain situations and facilities should be enabled to apply additional time if facility conditions and/or customer needs warrant.

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

Regional Association Comments:
WWMA 2019 Annual Meeting: Mr. Kurt Floren (L.A. County, CA), Mr. Brent Price (Gilbarco), Clark Cooney (CA DMS), Cadence Matijevich (NV) stated their support of the proposal but recommended a change to the proposed five-minute time period in that it was excessive.

The Committee agreed that the item has merit and should be given Voting status provided that the time period stated in the proposal as 180 seconds should be stated as "three minutes" and that the "(or five minutes where conditions warrant)" be deleted from the proposal as shown below.

> ***S.1.6.10. Automatic Timeout – Pay-At-Pump Retail Motor-Fuel Devices.*** *– Once a device has been authorized, it must de-authorize within* ~~***two minutes 180 seconds***~~ ***three minutes*** ~~***(or five minutes where conditions warrant)***~~ *if not activated. Re-authorization of the device must be performed before any product can be dispensed. If the time limit to de-authorize the device is programmable, it shall not accept an entry greater than* ~~***two minutes 180 seconds***~~ ***three minutes*** ~~***(or five minutes where conditions warrant)***~~*.*
> *[Nonretroactive as of January 1, 2017]*
> (Added 2016)

SWMA 2019 Annual Meeting: Brent Price (Gilbarco) stated that S.1.6.10 is confusing where it states "(or five minutes where conditions warrant)". He would like to see that statement removed.

The Committee agrees with Brent Price's comment and has modified the amendment as recommended. The Committee recommends this item as a Voting Item with the modified language.

> **Automatic Timeout – Pay-At-Pump Retail Motor-Fuel Devices.** – Once a device has been authorized, it must de-authorize within ~~**two minutes**~~ **180 seconds** ~~**(or five minutes where conditions warrant)**~~ if not activated. Re-authorization of the device must be performed before any product can be dispensed. If the time limit to de-authorize the device is programmable, it shall not accept an entry greater than ~~**two minutes**~~ **180 seconds** ~~**(or five minutes where conditions warrant)**~~.
> [Nonretroactive as of January 1, 2017]

NEWMA 2019 Interim Meeting: The Committee and the body agree that this item be moved to a voting status but with a change in language. The Committee believes 3-5 minutes is ambiguous and believes a specific timeout should be used. The suggested language is as follows:

> ***S.1.6.10. Automatic Timeout – Pay-At-Pump Retail Motor-Fuel Devices.*** *– Once a device has been authorized, it must de-authorize within* ~~***two minutes 180 seconds***~~ ***three minutes*** ~~***(or five minutes where conditions warrant)***~~ *if not activated. Re-authorization of the device must be performed before any product can be dispensed. If the time limit to de-authorize the device is programmable, it shall not accept an entry greater than* ~~***two minutes 180 seconds***~~ ***three minutes*** ~~***(or five minutes where conditions warrant)***~~*.*
> *[Nonretroactive as of January 1, 2017]*

(Added 2016)

During open hearings, Mr. John McGuire (NJ) and Mr. Frank Greene (CT) stated that he was unsure of what circumstances would lead to a need for a 5-minute timeout. Mr. Jason Flint (NJ) advised the group that the submitter was concerned about ADA compliance and other issues.

CWMA 2019 Interim Meeting: Charlie Stutesman (KS) commented that he supports the item if the 180 seconds is changed to 3 minutes and is concerned with the phrase "where conditions warrant" in relation to the 5-minute timeout and would support the item as voting with this removed. Ivan Hankins, IA, also supports these changes. We recommend this item move forward as a voting item with the above amendments.

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

LMD-20.3 UR.1.1. Discharge Hose.

Background/Discussion:
The submitter has received credible complaints regarding the way the hose is situated so that the hose can bump into grade selection buttons, causing an inadvertent grade selection to a higher grade. The following are the summary, conclusions and photos from an August 8, 2019 investigation report. The complete report is available at https://www.ncwm.com/publication-15.

Summary

- Complainant stated he selected regular and noticed at the end of the transaction that he was charged for premium
- The manager on duty stated to the complainant that this was common and the dispenser defaulted to a premium grade because the regular was not pressed hard enough
- The complainant was refunded the difference in price
- Inspector Daha and Supervisor Giliberto could not recreate the defaulting of the grade at this station of another station with the same model dispensers
- Inspector Daha and Supervisor Giliberto were able to select the premium grade through "hose bump" that didn't involve pressing the button with hands or the nozzle
- A current petroleum service man and a former service man who is a current weights & measure inspector both stated that they are not aware of any way to program a dispenser to default to a specific grade and also they are aware of the possibility of "hose bump"

Conclusions

- The manager on duty at [redacted] gas may have misspoken when he stated to the complainant that the dispenser defaults to premium if a grade is not selected in time by the customer
- A potential way premium may have been activated in the complainants transaction was through "hose bump"
- The model dispenser at this station is NTEP approved and would be difficult to order repaired or stop use
- Consumer Protection is making a referral Darrell Flocken at NTEP Administration regarding the approval of this dispenser
- Possible remedies could include changing the springs on the buttons to make them more difficult to select

10

WWMA 2019 Annual Meeting: The item was not submitted to this region.

SWMA 2019 Annual Meeting: The item was not submitted to this region.

NEWMA 2019 Interim Meeting: This proposal was a late submission to NEWMA and was accepted by the Committee to be included in our agenda. The Committee and the body agree that this item has merit and be given a developing status. During open hearings, submitter Mr. Frank Greene (CT) stated that the basis of this item has roots in a consumer complaint that his office had investigated and asked if anyone had similar experiences. Mr. Ethan Bogren (Westchester County, NY) stated that he has investigated about a dozen complaints of this nature and indicated that there is a software upgrade available from the manufacturer that will solve the issue. Mr. John McGuire (NJ) stated that moving the position of the hose, where it is attached to the pump, may also be a viable solution. The Committee also encourages the submitter to contact the manufacturer.

CWMA 2019 Interim Meeting: The item was not submitted to this region.

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

VTM – VEHICLE TANK METERS

VTM-18.1 S.3.1.1. Means for Clearing the Discharge Hose and UR.2.6. Clearing the Discharge Hose.

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

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

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

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

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

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

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

In discussing the changes OWM felt were needed prior to the Annual Meeting, the submitter and OWM agreed that some of OWM's proposed changes would be considered editorial and others technical in nature. Since other than

editorial changes could affect the Voting status of the item, OWM offered the following two courses of action for the Committee to consider:

1. Downgrade the item to Informational to allow time to address all the changes that are needed; or

2. Split the item into two parts to allow the portion of the item needing only editorial changes to move forward for vote; and carryover the remaining portion to allow time for it to be further developed and considered during the next NCWM cycle.

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

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

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

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

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

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

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

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

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

Regional Association Comments:

WWMA 2019 Annual Meeting: There were no comments during open hearings on this item.

The Committee agrees that the item has merit and this item failed to be adopted when voted upon during the 2019 NCWM Annual Meeting. The Committee agreed that the item should be given a Developing status and that the submitters work together to further develop the proposal considering the statements made by NIST OWM during the 2019 NCWM Annual Meeting open hearing and the amendments that were presented at that time.

SWMA 2019 Annual Meeting: Hal Prince (FL) stated that this item muddies the waters and will cause the unacceptable cross contamination of engine fuels.

The Committee recommends that this item move forward as a Developing Item, as long as the developers of VTM 18.1 and VTM 20.1 can combine their language to include an exception specifically for "Engine Fuels."

NEWMA 2019 Interim Meeting: The Committee and the body agree that this item be moved to voting status, but with some changes to language. The Committee believes that the item in its current form will place undue burden on the industry as it already uses manifold flush systems and retrofitting them will be costly. The following language is proposed:

(f) clear means, such as an indicator light or audible alarm, is used to identify when the valve is in use ***on both quantity indications and any associated recorded representations (e.g., using such terms as "flushing mode" or "not for commercial use");***
[nonretroactive as of January 1, ~~2022~~ 2024 ~~to become retroactive January 1, 2025~~]

(g) ***effective, automatic means shall be provided to prevent passage of liquid through any such flush system during normal operation of the measuring system; and***
[nonretroactive as of January 1, ~~2022~~ 2024 ~~to become retroactive January 1, 2025~~]

During open hearings, submitters Mr. Jim Willis (NY) and Mr. Steve Timar (NY) recommended removing retroactive dates and extend non-retroactive to 2024.

CWMA 2019 Interim Meeting: Charlie Stutesman, KS, commented that he supports the item with a developing status but is not sure about the requirements being retroactive and isn't sure this will prevent fraud. We recommend developing status.

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

VTM-20.1 S.3.1. Diversion of Measured Liquid.

Source:
Proposed change to Handbook 44, section 3.3.1 Vehicle Tank Meters, Specifications S.3.1 "Diversion of Measured Liquid". Changes made in 2018 were made to improve safety of operators of fuel delivery trucks that want to flush delivery lines because they have multiple liquid fuels but only one meter. There is a potential un-intended consequence this change creates, as described in the justification section. The intent of this new proposed change is to clarify the paragraph to protect vehicle motor fuel quality, retain safe operating procedures when handling vehicle motor fuels, and to prevent fraud during delivery of vehicle motor fuels from vehicle tank meters.

There are 3 main concerns with the changes that were made in 2018 to Handbook 44, Section 3.3.1 Vehicle Tank Meters, Specifications S.3.1 and S.3.1.1.

1) Contamination. Using the newly added "multiple hose, single discharge hose metering systems" exemption, fuels will get contaminated every time there is a change from one fuel to another. Perhaps it will usually be a small amount of contamination if the operator is well trained and attentive, but sometimes it will be a significant amount of contamination.

   In the case of fuel oils that are similar and are burned in stationary furnaces, some level of contamination may be acceptable to customers, and may not present a safety hazard. But, in situations where vehicle motor fuels are dispensed this way, a small amount of contamination could be problematic. We don't want off road dyed fuel being mixed with on-road diesel.

2) Safety. We obviously do not want to mix gasoline with diesel or kerosene.

3) Fraud. Since the diversion occurs in the discharge line after the meter, they is more chance of error, either by accidental or intentional fraud, due to paths being opened for measured fluid that takes it away from the discharge. Leaks in the valves blocking those paths will cause fraud.

For these reasons, it is proposed that a note be added to restrict the use of "multiple hose, single discharge hose metering systems" to Heating Oil only, and prohibit the use of "multiple hose, single discharge hose metering systems" for use with vehicle motor fuels.

Original author is mainly concerned about safety of fuel delivery truck operators due to the way fuel delivery trucks with one meter but multiple products are currently flushing lines. Our understanding is that the fuel delivery trucks with one meter but multiple products that want to flush their delivery line mainly, if not only, deliver fuel oil, not vehicle motor fuels.

Regional Association Comments:
WWMA 2019 Annual Meeting: Mr. Steve Harrington (OR) stated he sees potential issues with aviation fueling systems equipped with more than one hose.

The Committee recommends the item be given a Developing status and that the submitter of this proposal work with the submitters of item VTM-18.1 to coordinate the changes being recommended and to avoid conflicting requirements.

SWMA 2019 Annual Meeting: Hal Prince (FL) stated that he would like the term "non-Vehicle Motor Fuels" changed to "non-Engine Fuels" to protect non-vehicle engines such as boats, generators, and construction equipment from potential cross contamination of gasoline and diesel.

The Committee recommends this item move forward as a Developing Item, as long as the developers of VTM 18.1 and VTM 20.1 can combine their language to include an exception specifically for "Engine Fuels".

NEWMA 2019 Interim Meeting: The Committee and the body agree that this item be withdrawn due to its possible redundancy with VTM-18.1. During open hearings, Mr. John McGuire (NJ) stated he believes VTM-18.1 and VTM-

20.1 are almost the same and suggested that the submitter speak with the submitter of VTM-18.1. Mr. Steve Timar (NY) commented that NY has issues with having a carve out just for home heating fuel.

CWMA 2019 Interim Meeting: Charlie Stutesman (KS) commented that he supports the item as voting, Dick Suiter (Richard Suiter Consulting) relayed that the SWMA suggested removing the term vehicle. Loren Minnich, KS, asked whether it was appropriate to exempt trucks carrying other fuels. We believe that it is unclear what fuels are being targeted by this item and recommend the item move forward as developing.

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

VTM-20.2 Table T.2. Tolerances for Vehicle Mounted Milk Meters.

Background/Discussion:

Existing tolerances are based on the accuracy of the Flow meter itself. The proposed Tolerances are based on Milk Metering Systems where the magnetic flow meter is a part of the Milk Metering system handling milk containing air.

The accuracy of the Flow meter will always be influenced by the way it is used. The only way you can obtain the accuracy described by the manufacture is when the flow meter is operating as a "stand alone" unit and, equally important, only if the product passing through the flow meter is complete air-free.

The submitter provided the following:

> During the past 20 years, the need for improved efficiency in the collection of milk has resulted in the use of milk pumping equipment being installed on milk tankers.
>
> One of the most obvious places for a modern Dairy to optimize is the amount of time that the milk tanker uses to make a collection. If you can reduce the collection time at each farmer, the Dairy will be able to get a significant reduction in collection and transport cost for the benefit of the Farmer, Consumer and the Dairy itself. At the same time, you will get an environmental benefit as a result of reduced CO2 in the milk collection process.
>
> The consequence of introducing pump systems on milk tankers is that it causes air to be mixed with the milk which again will influence the accuracy of the magnetic flow-meter mounted in the system. Milk entrains air unlike petroleum liquids which do not. As you know, the flow meter will count anything that passes through the meter – liquid as well as air – and it is therefore essential that as much air as possible is removed from the milk before it reaches the flow-meter. However, it is widely recognized that it is not possible to remove all the air from the milk, which will result in an inaccuracy.
>
> It is therefore essential that the tolerances for vehicle mounted milk pump systems using magnetic flow-meters for determining milk volume reflects todays way of collecting milk. This means that existing Tolerance for milk meters cannot be used when the milk meter is a part of a system where different system parts will influence the accuracy of the count. Such milk metering systems will need to be classified with their own tolerances.
>
> Based on our 25 years of experience as a manufacturer of these systems and more than 3000 installations on milk trucks operating in more than 15 countries, we would like to propose that the Tolerance for Vehicle Mounted Milk Metering Systems is changed from 0.3% to 0.5% and that the tolerances will be listed and classified separately and not be associated with products from the oil industry. Our proposal is consistent with Weights & Measures tolerances accepted around the world.

We hope that the NCWM will consider our proposal and we will be more than happy to meet with you and answer any questions you may have. We believe that a change of Tolerance is necessary in order for the Handbook 44 to reflect today´s milk collection and the technical progress within milk collection.

Yours sincerely

Poul Tarp
President POUL TARP A/S

The POUL TARP milk pump system holds an MID approval which is recognized and in accordance with guidelines and standards described in the **OIML - INTERNATIONAL ORGANIZATION OF LEGAL METROLOGY**

FLOW COMPUTERS REGULATION IN THE US:

DANAK

FORCE Certification

EC-Type Examination Certificate
Measuring Instrument Directive

Certificate number: DK-0200-MI005-006
Issued by FORCE Certification, Denmark
EC-notified body number 0200

In accordance with the Directive 2004/22/EC of the European Parliament and Council of March 31st, 2004 on measuring instruments (MID) with later amendments.

Issued to:	**Ingeniørfirmaet Poul Tarp A/S** **Jomfruløkken 4** **DK - 8930 Randers NØ** **Denmark**
Reference No.:	115-24938
Type of instrument:	Milk Measuring System on road tankers (or stationary)
Type designation:	PT LVMS - Poul Tarp Liquid Volume Measuring System
Type variants:	type 2, type 3 and type 4
Valid until:	August 10, 2025
Number of pages:	38 including appendix
Date of issue:	August 10, 2015

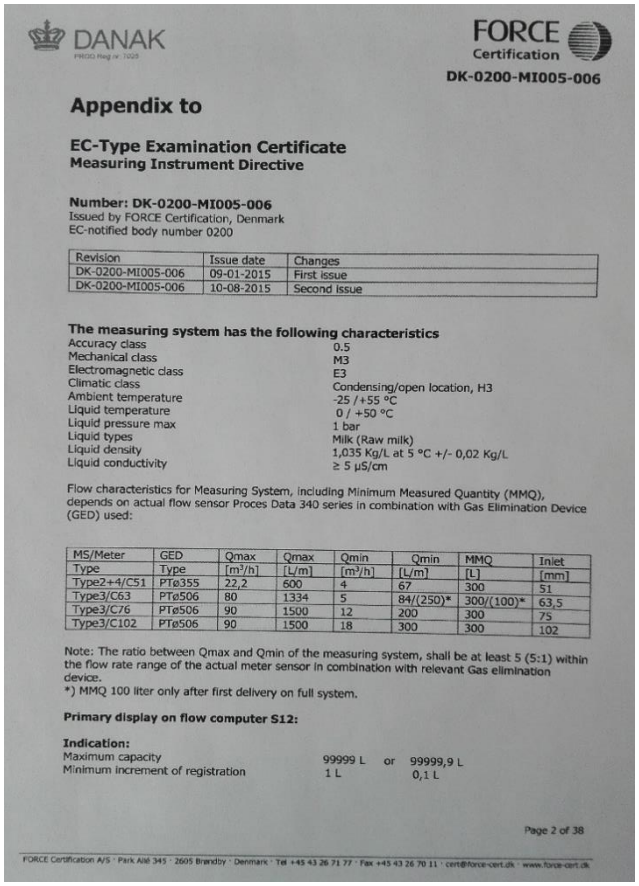
Approved by
Lene Savstrup Kristensen
Certification Manager

Processed by
Lars Parmo
Examiner

The conformity markings may only be affixed to the above type approved equipment. The manufacturer's Declaration of Conformity may only be issued and the notified body identification number may only be affixed on the instrument when the production/product assessment module (D or F) of the Directive is fully complied with and controlled by a written inspection agreement with a notified body. This EC-type examination certificate may not be reproduced except in full, without written permission by FORCE Certification.

Page 1 of 38

FORCE Certification A/S · Park Allé 345 · 2605 Brøndby · Denmark · Tel +45 43 26 71 77 · Fax +45 43 26 70 11 · cert@force-cert.dk · www.force-cert.dk



DANAK

FORCE Certification

DK-0200-MI005-006

Appendix to

EC-Type Examination Certificate
Measuring Instrument Directive

Number: DK-0200-MI005-006
Issued by FORCE Certification, Denmark
EC-notified body number 0200

Revision	Issue date	Changes
DK-0200-MI005-006	09-01-2015	First issue
DK-0200-MI005-006	10-08-2015	Second issue

The measuring system has the following characteristics

Accuracy class	0.5
Mechanical class	M3
Electromagnetic class	E3
Climatic class	Condensing/open location, H3
Ambient temperature	-25 /+55 °C
Liquid temperature	0 / +50 °C
Liquid pressure max	1 bar
Liquid types	Milk (Raw milk)
Liquid density	1,035 Kg/L at 5 °C +/- 0,02 Kg/L
Liquid conductivity	≥ 5 µS/cm

Flow characteristics for Measuring System, including Minimum Measured Quantity (MMQ), depends on actual flow sensor Proces Data 340 series in combination with Gas Elimination Device (GED) used:

MS/Meter Type	GED Type	Qmax [m³/h]	Qmax [L/m]	Qmin [m³/h]	Qmin [L/m]	MMQ [L]	Inlet [mm]
Type2+4/C51	PTø355	22,2	600	4	67	300	51
Type3/C63	PTø506	80	1334	5	84/(250)*	300/(100)*	63,5
Type3/C76	PTø506	90	1500	12	200	300	75
Type3/C102	PTø506	90	1500	18	300	300	102

Note: The ratio between Qmax and Qmin of the measuring system, shall be at least 5 (5:1) within the flow rate range of the actual meter sensor in combination with relevant Gas elimination device.
*) MMQ 100 liter only after first delivery on full system.

Primary display on flow computer S12:

Indication:

Maximum capacity	99999 L	or	99999,9 L
Minimum increment of registration	1 L		0,1 L

Page 2 of 38

FORCE Certification A/S · Park Allé 345 · 2605 Brøndby · Denmark · Tel +45 43 26 71 77 · Fax +45 43 26 70 11 · cert@force-cert.dk · www.force-cert.dk

DANAK
PROD Reg.nr. 7025

FORCE Certification
DK-0200-MI005-006

Applied documents

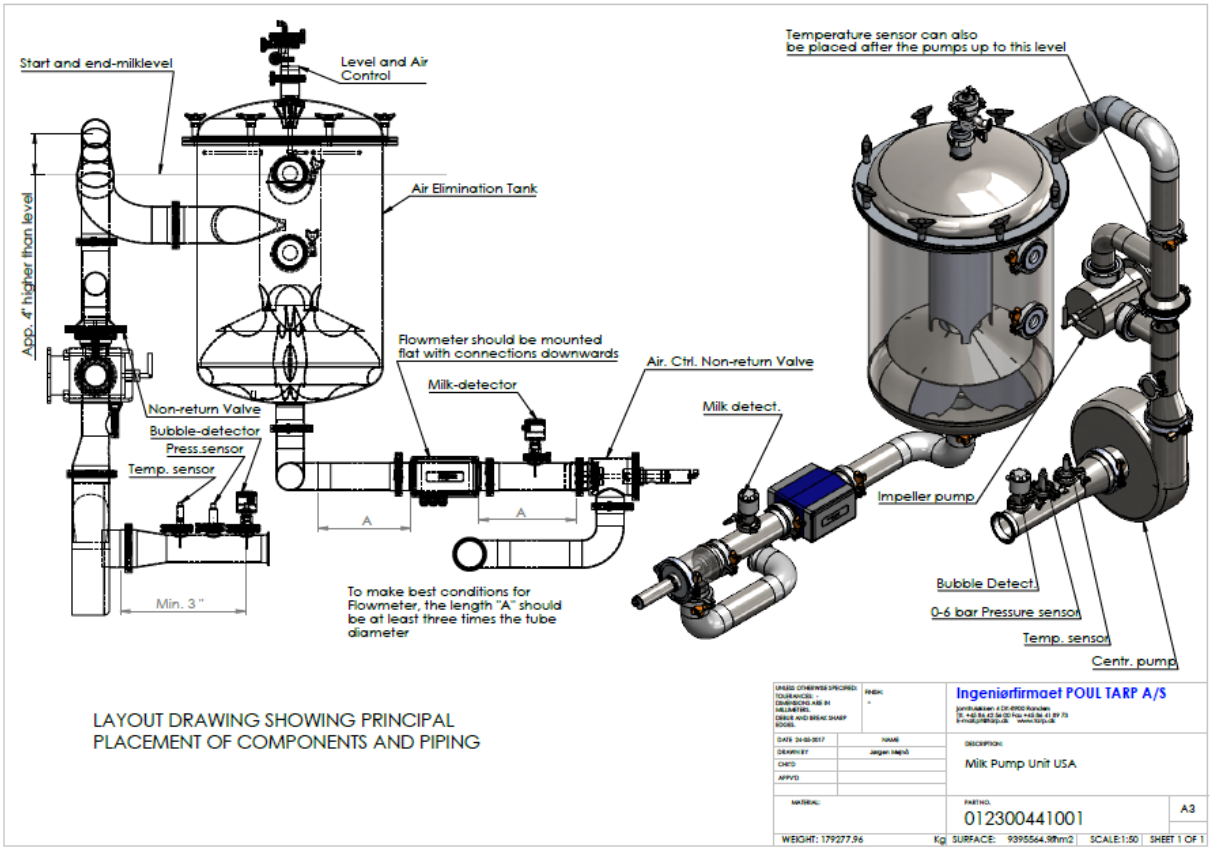
Recommendations	Guides
OIML R117 (1995)	WELMEC Guide 10.5 Marking of fuel dispensers (2006)
OIML R117-1 (2007)	WELMEC Guide 10.6 Sealing of fuel dispensers (2008)
OIML D11 (2004)	
OIML R117-2 Annex – E (CD2)	

Applied Evaluation Certificates belonging to this Type Examination Certificate:

- Evaluation Certificate Force Certification No. 115-24938.05, issued 10.08.2015
- Evaluation Certificate and Description NMI no. TC7204 rev 6, issued 26 august 2014
- Documentation folder NMI no. TC7204-4

Technical documentation
Reference no.: 114-30557.

The standards related to metrological aspects come from OIML R117-1 for liquids (Dynamic measuring systems for liquids other than water, part 1: Metrological and technical requirements) and documents D11 (General requirements for electronic measuring instruments) and D31 (General requirements for software controlled measuring instruments) from OIML



WWMA 2019 Annual Meeting: The proposal was not addressed by this region.

SWMA 2019 Annual Meeting: The proposal was not addressed by this region.

NEWMA 2019 Interim Meeting: The proposal was not addressed by this region.

CWMA 2019 Interim Meeting: Charlie Stutesman (KS) commented that there are no active NTEP CC's for these types of meters. Several regulators commented that they would like this to move forward as developing to, possibly, allow for innovation in the way milk is measured. We recommend developing status for this item.

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

LPG – LPG AND ANHYDROUS AMMONIA LIQUID-MEASURING DEVICES

LPG-20.1 S.2.5. Zero-Set-Back Interlock and S.2.6. Automatic Timeout.

Background/Discussion:
Similar metering technology is in use in corresponding stationary, vehicle-mounted, and vehicle refueling applications across multiple handbook measuring devices codes. In each case once the system is turned off no new delivery can be initiated until all indications are returned to zero. Additionally, in instances where deliveries do not commence within a specified period after a system is authorized, the system must automatically deauthorize the transaction. This proposal further clarifies LPG measuring devices code requirements for the zero-set-back interlock and automatic timeout features and aligns the operation of equipment across corresponding handbook codes.

This proposal is a follow-on to changes adopted to the LPG Code in July 2019 and is intended to reformat the requirements for zero-set-back interlock and time-out features for clarity and consistency in the LPG code to align the format with other measuring devices codes. OWM recommends the proposed changes to align the corresponding requirements for stationary retail motor-fuel dispensers (RMFDs) and other stationary devices and vehicle-mounted applications with those in Section 3.30 Liquid-Measuring Devices (LMD) and Section 3.31 Vehicle Tank Meters (VTM) Codes. Unlike the VTM Code and the LMD Code, the LPG & Anhydrous Ammonia (NH_3) Code addresses both vehicle-mounted and stationary devices. This proposal would address the zero-set-back interlock and timeout requirements in separate paragraphs.

OWM notes that a paragraph was added to the LMD Code in 2016 to include a provision for an automatic timeout on "pay-at-pump" retail motor fuel dispensers where payment is rendered via a card at the dispenser. It was not until 2019 that a corresponding paragraph was made part of LPG code to address LPG retail motor-fuel dispensers. By modifying the LPG timeout requirements making them separately designated paragraphs (i.e., new S.2.6.1. and S.2.6.2.) the LPG code requirements will include clearer language that mirrors the corresponding LMD requirement for RMFDs.

OWM acknowledges the 2019 comments from CWMA and SWMA expressing a preference for a two-minute time out rather than a three-minute time out to harmonize with other codes. OWM has found that a time out limit of three minutes aligns with the current VTM Code while a two-minute time out limit aligns with the current LMD Code for stationary devices.

Regional Association Comments:
WWMA 2019 Annual Meeting: Mr. John Barton (NIST OWM) stated that this item is a follow-up item to changes that were adopted in the NCWM Annual Meeting in July 2019. It is intended to reformat requirements for zero-set back interlock in the LPG Code to align with requirements in the LMD and VTM Codes.

The Committee agrees with the proposal and recommends a Voting status.

SWMA 2019 Annual Meeting: Diane Lee (NIST OWM) recommended the Committee harmonize the language in this item to align with the LMD Code in the handbook.

After consideration of this item the Committee recommends this item be made a Voting Item with the term "two minutes" changed to "180 seconds" on lines 46 and 48 on page S&T 49.

NEWMA 2019 Interim Meeting: The Committee and the body agree that this item should be listed as voting but with a language change. The Committee believes that to be consistent with other timeout requirements, the term "two minutes" shall be changed to "180 seconds) on lines 46 and 48 on page S&T 50. During open hearings, Mr. Dick Suiter (Richard Suiter Consulting) commented that he would recommend a language change to 3 minutes. Mr. John McGuire (NJ) and Mr. Jim Willis (NY) agreed with Mr. Suiter's comments.

CWMA 2019 Interim Meeting: Charlie Stutesman (KS) commented that he would like this item separated and that S.2.5. move forward as voting and S.2.6. move forward as developing until the length of the time out is sorted out. We recommend the item be separated and that S.2.5. move forward as voting and S.2.6. move forward as developing for these reasons.

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

WTR – WATER METERS

WTR-20.1 S.3.2. Meter size and Directional Flow Marking Information.

Background/Discussion:

Meter size must be identified to select the suitable device for the application. (NIST H-44 G-UR.1. Selection Requirements.) Water flow direction must be identified to help ensure the device is installed correctly. (NIST H-44 G-UR.2. Installation Requirements.)

The proposed amendments, if adopted, would require additional marking and may impact manufacturing processes.

Regional Association Comments:

WWMA 2019 Annual Meeting: The Committee agrees this item has merit and that it should be given a Voting status. During open hearing session, Mr. Clark Cooney (CA) stated his support for the item.

SWMA 2019 Annual Meeting: No comments were heard on this item. The Committee decided to make No Recommendation.

NEWMA 2018 Interim Meeting: The Committee and the body agree that this item should be moved to voting status. No comments were heard regarding negative aspects to the proposal.

CWMA 2019 Interim Meeting: Rachelle Miller (WI) supports this as a voting item. We recommend the item move forward as voting.

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

WTR-20.2 S.1.1.4. Advancement of Indicating and Recording Elements.

Background/Discussion:

Existing NTEP certified water meters function based on either a mechanical or a non-mechanical measuring element. Non-mechanical water meters do not contain moving parts that change position (rotate) proportional to water flow traversing the meter. Instead, these meters calculate and register volume based on non-invasive flow velocity measurements and other physical parameter determinations. Common non-mechanical water meter designs make use of the ultrasonic flow measuring principle, such as those conformed by NTEP CC no. 17-141 or 19-018. Future

technologies are also expected to rely on other kinds of contactless flow measuring principle, e.g., electromagnetic induction.

To strict interpretation of current code language, ultrasonic and non-mechanical water meters would not be able to comply to S.1.1.4. The intent of this proposal is to harmonize this paragraph with existing language in similar codes such as 3.34. Cryogenic Liquid-Measuring Devices or 3.38. Carbon Dioxide Liquid-Measuring Devices, and to clarify the intent of the requirement is to apply not only to water meters that measure volume mechanically, but also to non-mechanical water meters.

Regional Association Comments:
WWMA 2019 Annual Meeting: Mr. Garrett Cooper (San Diego County, CA) stated that there are many non-mechanical meters in use that incorporate non-invasive technology and that the proposal should be expanded to include all meters. Mr. Kurt Floren (L.A. County, CA) stated that he is not comfortable with the use of the term "normal" operation and suggests that there is a better means to define this. Mr. Floren suggests the description "as intended by the manufacturer" as a replacement. Mr. Clark Cooney (CA) agrees and recommends a change to the use of "normal" operation.

The Committee agreed that the item has merit however, there were some concerns about the use of the word "normal" in the proposal in reference to the operation of the device. The Committee agree this proposal should be assigned a Developing status. The Committee also recommends the submitter work with CA DMS and LA County to wordsmith the terminology used in the proposal.

SWMA 2019 Annual Meeting: Committee heard no comments on this item. The Committee decided to make No Recommendation.

NEWMA 2019 Interim Meeting: The Committee and the body agree that this item be moved to a voting status, but with a language change. The Committee is concerned with the use of the term "normal". The language change suggested is "as intended by the manufacturer". During open hearings, Mr. Frank Greene (CT) suggested replacing "normal" with another term as it is ambiguous. Mr. Jason Flint (NJ) presented the language change offered by the Western Weights and Measures Association report.

CWMA 2019 Interim Meeting: Charlie Stutesman (KS) commented that he supports this item as voting if the phrase "be susceptible to" is removed and the word "advancement" is changed to "advance" as shown above. We recommend this item as a voting item with these changes.

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

MFM – MASS FLOW METERS

MFM-20.1 S.1.3.3. Maximum Value of Quantity Divisions.

Source:
During its March 2019 collaborations with Mr. Dimitri Karimov (Liquid Controls, LLC) to rework the requirement, OWM was made aware that there is a gap in this requirement with regard to the maximum quantity-value division for gases other than CNG. OWM did not want to make any such corrective amendments to include *all* other gas applications at that time believing that this could jeopardize the proposal moving forward for adoption at the July 2019 NCWM Annual Meeting. OWM instead developed this proposal for submission in the 2020 cycle for a new paragraph to be designated S.1.3.3.(b) to address the maximum permitted value of "d" for all other gases. Additional letters, presentation and data may have been submitted for consideration with this item. Please refer to https://www.ncwm.com/publication-16 to review these documents.

Specifying the maximum size of the unit recognized for the sale of a commodity is: 1) consistent across the handbook codes; 2) essential for the selection of suitable dispensing equipment; and 3) necessary to facilitate transparency in sales transactions and for making comparisons in fuel pricing. A specification to address the maximum value of "d" for vapor (gaseous) products clearly applicable in Application paragraph A.2 was inadvertently omitted in previous modifications of the code in 1994 and 2016 to address "d" for alternative fuel applications. In spring 2019 while already in the process of addressing limits for the maximum "d" for LNG applications, it was deemed that any further amendments to the code to fully address all other product applications be resubmitted for national consideration during the 2020 weights and measures standards development cycle. This latest proposal clarifies and places a limit on the maximum value of the quantity division for indicated and recorded deliveries of hydrocarbon gases in the vapor state which is currently missing from the code.

In 2019 the weights and measures community was informed about the planned 2020 update of paragraph S.1.3.3 to specify a maximum quantity value for "d" for all other gas applications. No opposing arguments have been heard at this time since the proposed modification to paragraph S.1.3.3 is considered more of a housekeeping item.

Regional Association Comments:

WWMA 2019 Annual Meeting: Mr. John Barton (NIST OWM) commented that there was a gap noted in the changes adopted to S.1.3.3. during the 2019 NCWM Annual Meeting where gasses other than compressed natural gas were not addressed. This proposal amends the paragraph to address that issue. The Committee agrees that the item should have a Voting status.

SWMA 2019 Annual Meeting: Committee heard no comments on this item. The Committee decided to make No Recommendation.

NEWMA 2019 Interim Meeting: The Committee and the body agree that this item be moved to voting status as there is no negative aspects to the proposal. During open hearings, Mr. James Cassidy (MA), Mr. Steve Timar (NY) and Mr. Jim Willis (NY), NY voiced support.

CWMA 2019 Interim Meeting: Charlie Stutesman (KS) commented that he supports this item as voting. We recommend this item as a voting item.

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

EVF – ELECTRIC VEHICLE FUELING SYSTEMS

EVF-19.1 D S.3.5. Temperature Range for System Components. and S.5.2. EVSE Identification and Marking Requirements.

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

Ms. Juana Williams
NIST OWM
100 Bureau Drive M/S 2600
Gaithersburg, MD 20899-2600
(301) 975-3989, juana.williams@nist.gov

Background/Discussion:

In 2012 the USNWG began work to develop legal metrology standards for electricity measuring systems used in both electric vehicle fueling and submetering applications under a single code. In 2014 the USNWG agreed to widen the temperature range in NIST HB 44, section 3.40, paragraph S.3.5. for systems components to – 40 °C to + 85 °C based on input that the wider range is an ANSI standard commercial temperature range. This range was adopted in 2015 and appears in the current NIST HB 44. However, only in ANSI C12.1 Section 4 in 4.7.3.16 Test Number 30 Effect of Operating Temperature is – 30 °C specified as the lowest minimum temperature limit and in 4.7.3.17 Test Number 31 Effects of Relative Humidity is + 85 °C specified as the maximum temperature limit.

Electric Vehicle Service Equipment (EVSE) must be capable of operating accurately over the temperature range specified in Section 3.40 Electric Vehicle Fueling Systems – Tentative Code or marked accordingly. Paragraph S.3.5. Temperature Range for Systems Components specifies that an EVSE not capable of operating over the specified temperature range of – 40 °C to + 85 °C (− 40 °F to 185 °F) must be marked with its narrower temperature range as shown below.

> **S.3.5. Temperature Range for System Components. –** EVSEs shall be accurate and correct over the temperature range of – 40 °C to + 85 °C (− 40 °F to 185 °F). If the system or any measuring system components are not capable of meeting these requirements, the temperature range over which the system is capable shall be stated on the NTEP CC, marked on the EVSE, and installations shall be limited to the narrower temperature limits.

The submitter has been working to ensure there are no inconsistencies between the temperature range requirements specified for the EVSE's operation and the requirement in paragraph S.5.2. EVSE Identification and Marking Requirements that specify an EVSE must be marked with its temperature limits when they are narrower than and within – 20 °C to + 50 °C (− 4 °F to 122 °F).

During the 2019 NCWM Interim Meeting open hearings, the Committee heard no comments on item EVF-3. During the committee's work session, the members agreed with the submitter and the regional weights and measures associations that this item should be assigned developing status.

During the 2019 NCWM Annual Meeting, Mrs. Tina Butcher (NIST OWM) updated the Committee stating that work is ongoing through the USNWG subcommittee and recommends that this item be carried over to the next revision cycle. The Committee agreed by retaining the item's Developing status and no changes to the item were recommended at this time.

The NCWM National Type Evaluation Program (NTEP) has indicated that a temperature range of – 40 °C to + 85 °C (− 40 °F to 185 °F) is beyond the capabilities of its evaluation laboratories. An option that NTEP has also indicated it may explore is to accept data from accredited facilities capable of testing systems over the entire – 40 °C to 85 °C (– 40 °F to 185 °F) temperature range. Manufacturers will have to provide the test data needed by NTEP to evaluate these systems for this environmental factor.

NIST has received some feedback and is continuing an assessment of the temperature ranges specified in these paragraphs. To date no negative comments have been received on the newly developed proposal for expanding the paragraph S.5.2 marking requirement temperature range from – 20 °C to + 50 °C (− 4 °F to 122 °F) to – 40 °C to + 85 °C (− 40 °F to 185 °F) from the inquiry circulated to the USNWG Electric Vehicle Fueling Equipment Subgroup. The proposed modification to paragraph S.5.2 also appears to align the marking and operating temperature range requirements in NIST HB 44 with the requirements California is developing for its California Code of Regulations Section 4002 EVFS (3.40).

The proposed modification to paragraph S.5.2 to align the marked temperature range limits with those specified for operation of an EVSE will eliminate any inconsistencies for this parameter. Consequently, having heard no opposition to this modification the submitter recommends this item's status be upgraded from developing to voting in 2020.

Regional Association Comments:

WWMA 2019 Annual Meeting: Mr. Clark Cooney (CA) stated his support for this item. The Committee agrees that the item is fully developed and should be given a Voting status.

SWMA 2019 Annual Meeting:

NEWMA 2019 Interim Meeting: The Committee and the body agree that this item be moved to voting status. During open hearings, Mr. Jim Willis (NY) commented that the markings on EVSE are currently widely varied and supports the changes. Mr. James Cassidy (MA) and Mr. John McGuire (NJ) voiced support.

CWMA 2019 Interim Meeting: Committee heard no comments on this item. The Committee decided to make No Recommendation.

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

EVF-20.1 S.1.3.2. EVSE Value of the Smallest Unit.

Background/Discussion:

In 2014 the U.S. National Work Group (USNWG) on Electric Vehicle Fueling and Submetering (EVFS) deliberated about the Electric Vehicle Fueling System's appropriate value for the display of electrical energy when sold in kilowatt-hour units of measurement. Based on the typical EVSE's ratings (i.e., charging power and current) the work group agreed that the value of the indicated or recorded charge should be in increments of 0.001-kilowatt hour (kWh). Members of the work group noted that the value could be inexpensively modified. Most recently it has been determined that the currently specified value of 0.001 kWh for the electricity unit of measurement in relation to the time for a test standard to complete an accuracy test at 10 % of the maximum deliverable amperes increases the length of the test by a factor of 25.

Each NIST Handbook 44 code specifies the appropriate unit(s) of measurement (indicated and recorded) that is permitted for all device applications that a code applies to. The accepted SI (metric) unit of measurement for a device application in each code is in most cases followed by its equivalent corresponding recognized U. S. customary unit. Measurements in SI or customary units can be supported through calibrations by an accredited (or recognized) laboratory. Each handbook code also specifies the maximum value for a unit of measurement that can be indicated or recorded by the device for a specific product application or rate of delivery.

Unlike the scales' codes, the EVSE code specifies the "smallest" value of the unit that is permitted to be indicated for the quantity of electricity being measured; whereas the scales codes specify the value that the unit *shall be equal to* or *shall not be greater than*. The language in the scales code clearly states that there is only one acceptable value for the unit of measurement or establishes a value that the unit cannot exceed.

The measuring devices codes specify that the smallest value for the unit of delivery indicated or recorded for a commodity *shall not exceed* a specific value. The value varies depending on the type of commodity and/or device's flow rate or falls into the category of all other meters. Yet it is clear the unit of measurement's value cannot be exceeded although lesser values are acceptable if the device has that capability, maintains accuracy, and sales in that particular indicated or recorded quantity are appropriate.

To provide adequate resolution (i.e., value of the kWh unit) in the EVSE's customer display of the electrical energy transaction information and to facilitate accuracy testing of the system two alternate proposals were developed that recommend somewhat different modifications of paragraph S.1.3.2. EVSE Value of Smallest Unit.

The first option for modifying the code that was developed and circulated to the Electric Vehicle Fueling Equipment (EVFE) Subgroup for consideration would be to recognize EVSEs equipped with a customer display of 0.005 MJ or 0.001 kWh and a test mode display on the EVSE face, accessible internally, or activated by controls accessed by the official that indicates in 0.0005 MJ or 0.0001 kWh increments.

Also, part of the information circulated to the Subgroup included a second option of modifying the value of the displayed and/or recorded kilowatt-hour energy units from 0.005 MJ or 0.001 kWh to a higher resolution of 0.0005 MJ or 0.0001 kWh. The first option shown below would modify paragraph S.1.3. EVSE Units to include a new subparagraph S.1.3.3. EVSE Value of Smallest Unit Test Mode to allow for a higher resolution value of the kilowatt-hour indications as a test mode display separate from the display used for the display transaction. The test mode display would either continuously indicate on the face of the dispenser or an internal display accessible during the inspection and test of the dispenser or display the quantity by using controls on the device

S.1.3. EVSE Units.

S.1.3.3. EVSE Value of Smallest Unit Test Mode. – EVSE shall display the electricity measured for each transaction in 0.0005 MJ or 0.0001 kWh energy units through:

(a) a continuous indication on the face of the EVSE;

(b) an internal display accessible during the inspection and test of the EVSE;

or

(c) a display of the quantity by using controls on the device.

(Added)

S.1.3.~~3~~4. Value Defined. …

(Amended 2020)

A test display mode is permissible for the mass flow meter compressed natural gas and liquefied natural gas dispenser applications. Although this option was entertained by the USNWG in 2014, further discussion would be needed to provide guidelines on how the indication must operate to comply with handbook requirements. When this option was circulated in 2019 to the USNWG EVFE Subgroup, the interest was more in favor of a single higher resolution display (i.e., 0.0001 kWh). However, there was some concern expressed about potential rounding issues were there to be two separate indications having different display resolution.

Since the 2015 adoption of NIST HB 44 Section 3.40 paragraph S.1.3.2. EVSE Value of Smallest Unit has specified that the smallest unit of indicated delivery by an EVSE, and recorded delivery if the EVSE is equipped to record, shall not be greater than 0.005 MJ or 0.001 kWh. It is anticipated that the community would question the cost to modify the equipment's design; however, after discussions about the possible quantity value of "d" as large as 0.1 kWh, industry indicated that the value for the unit of measurement could be inexpensively modified. The EVSE code has tentative status and to date no equipment has undergone the type evaluation process. The community anticipates there will be slight modifications to requirements and test procedures to address various generations of equipment, design configurations, and business models in the marketplace.

Regional Association Comments:

WWMA 2019 Annual Meeting: Mr. Clark Cooney (CA) stated his support for this item. The Committee agrees that the item is fully developed and should be given a Voting status.

SWMA 2019 Annual Meeting: Committee heard no comments on this item. The Committee decided to make No Recommendation.

NEWMA 2019 Interim Meeting: The Committee and the body agree that this item be moved to a developing status as it has merit. During open hearings, Mr. Steve Timar (NY) questioned if MMQ should also be changed. Mr. Jim Willis (NY) stated that moving the resolution to 1/10,000th may be a little extreme and recommends changing the resolution to 1/1000$^{th.}$ He also questions whether changing the resolution effects the time to conduct a test.

CWMA 2019 Interim Meeting: We recommend this item as a voting item.

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

TXI – TAXIMETERS

See Block 3 Items: Tolerances for Distance Testing.

TIM – TIMING DEVICES CODE

TIM-20.1 S.1.1.3. Value of Smallest Unit.

Background/Discussion:

In 2015 modifications were made to NIST Handbook 44 Section 5.55 Timing Devices to address an electric vehicle fueling system (EVFS) capable of applying additional fees for time-based services. However, no limits were placed on the value of the smallest unit of indicated time and recorded time in the equipment's design requirements.

Charging sessions will vary from twenty minutes to twelve hours depending on the capacity of the electric vehicle and EVFS. An EVFS must also make available in either printed or electronic format complete and clearly defined transaction information about the start and stop time of a service, power loss event, or rate change. This transaction information for time intervals must be available in values or increments that ensure transparency when displayed or recorded and allow for straight forward value comparison of services in the calculation of fees.

Current Timing Devices Code paragraph S.1.1.3 Value of Smallest Unit specifies the maximum value of increments of time indicated or recorded by a parking meter and other devices such as laundry dryers or car washes that measure time during which services are being dispensed. Since modifications to the code in 2015 did not address the permissible smallest value of the unit of time on EVSEs; this proposed modification of paragraph S.1.1.3. establishes a limit on the unit of time at one minute for time less than or equal to 60 minute and in hours and minutes for time intervals greater than 60 minutes.

NIST Handbook 44 Section 5.55 Timing Devices Code paragraph S.1.1.2 Units specifies that indications and recorded representations of time shall be in terms of minutes for time intervals of 60 minutes and hours and minutes for time intervals greater than 60 minutes. Paragraph S.1.1.2 does not specify what a suitable *maximum* value of the quantity division for EVSE time-based indications should be which is necessary given the range in length of a charging session can be 20 minutes to 12 hours and for additional time-based fees (such as idling after a full charge) that can also vary and might be assessed in conjunction with the electrical energy delivery. Consequently, a proposal to modify paragraph S.1.1.3 was developed to include specific requirements that were inadvertently omitted in the 2015 updates to the Timing Devices Code to addresses the EVSE application.

A similar recommendation has been submitted to modify the corresponding EVFS requirement in NIST HB 44 Section 3.40 Electric Vehicle Fueling Systems – Tentative Code paragraph S.1.3.2. EVSE Value of Smallest Unit to specify the maximum permissible value of the indicated and/or recorded electrical energy unit by an EVSE.

Regional Association Comments:

WWMA 2019 Annual Meeting: There were no comments heard during the open hearing session on this item. The Committee agrees that the item is fully developed and should be given a Voting status.

SWMA 2019 Annual Meeting: Committee heard no comments on this item. The Committee decided to make No Recommendation.

NEWMA 2019 Interim Meeting: The Committee and the body agree that this item be moved to a voting status. Mr. James Cassidy (MA) and Mr. Jim Willis (NY) voiced support.

CWMA 2019 Interim Meeting: Mr. Doug Musick (KS) commented that it may not be clear when part (b) and (c) apply. We recommend this item move forward as a developing item.

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

GMA – GRAIN MOISTURE METERS 5.56 (A)

GMA-19.1 D Table T.2.1. Acceptance and Maintenance Tolerances Air Oven Method for All Grains and Oil Seeds.

Background/Discussion:

samples and list of grains that AMS, FGIS request from states to include in their ongoing calibration program. States and other interested parties wanted to verify that corn samples from their state were included in the calibration data for NTEP meters because of variations states reported between UGMA meter and other meter technologies on corn samples.

During the 2016 Grain Analyzer Sector Meeting, numerous instances of inconsistent moisture meter measurements involving grain shipments from U.S. interior facilities to U.S. export port facilities were reported. The Sector received a suggestion that if the UGMA can make better measurements, then the Sector should consider reducing the applicable tolerances in NIST HB 44. At the 2016 and 2017 Grain Analyzer Sector meetings Mr. Charlie Hurburgh (Iowa State University) agreed to chair a GA Sector Task Group to review the current NIST HB 44 tolerance with both UGMA meters and Non-UGMA meters. During the 2018 meeting Mr. Hurburgh reported that based on data he analyzed from Iowa State Weights and Measures Grain Inspection reports, UGMA meters read closer to the reference air oven moisture results than non-UGMA meters.

It was also noted during the 2018 NTEP Grain Analyzer Sector meeting that the current tolerances were developed in 1991 and have not been changed to coincide with the change in technology for these devices; and this action is needed for grain industry risk management.

Prior to the 2019 NCWM Interim Meeting, all four regional weights and measures associations agreed to forward the proposal as a voting item on the Interim Agenda. However, following the regional meetings, additional data was submitted to the Sector which indicates a need to consider developing different tolerance for some grain types. Through a subsequent ballot, and a majority vote, the Sector agreed to recommend changing the status of the item to developing to provide the Sector time to consider additional data and changes to its original proposal.

During the NCWM 2019 Interim Meeting, the NCWM S&T Committee heard comments to agenda item GMA-3. Mr. Loren Minnich (KS) commented that he spoke with Ms. Diane Lee (NIST OWM) and she reported that one state was concerned with the application of the reduced tolerances to all grain types, specifically grains with hulls or husks. He suggested that this item be assigned a "Developing" status to allow for more research into this issue. The committee also received written comments from NIST, OWM (see NIST, OWM Analysis posted on the NCWM Website). During the 2019 Interim Meeting, the S&T Committee considered the comments during the opening hearing and comments submitted prior to the meeting and assigned a "Developing" status for this item.

At the 2019 NCWM Annual Meeting, Ms. Diane Lee (NIST OWM) provided an update on the history of the item. She noted that the GA Sector will review data from Arkansas at its 2019 meeting intended to assure that proposed changes to the tolerances can be applied to all grains. Ms. Lee speaking on behalf of the Sector stated that the Developing status assigned to this item is appropriate.

Regional Association Comments:

WWMA 2019 Annual Meeting: Mr. Russ Vires (SMA) stated the SMA takes no position on this item and looks forward to additional analysis by the submitter.

The Committee agrees the item has merit however, based on input provided from the NTEP Grain Analyzer Sector there will be additional data provided to the Committee prior to the 2020 NCWM Interim Meeting. The Committee agrees the item should be designated as a Developing item.

SWMA 2019 Annual Meeting: Russ Vires (SMA) stated he had no position on this item. Diane Lee (NIST OWM) stated that nationwide testing on more grains would be taking place to aid in any tolerance change determinations. She recommended this item remain Developing.

The Committee recommends this item to remain a Developing Item so that more detailed tolerances can be determined.

NEWMA 2019 Interim Meeting: The Committee and the body agree that this item should continue as a developing item. No comments were heard during open hearings.

CWMA 2019 Interim Meeting: Mr. Doug Musick (KS) commented that AR had concerns that meters may not be capable of operating within these tolerances for some grains. Ivan Hankins supports developing status until more data is received. We recommend this item move forward as a developing item.

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

GMA-20.1 S.2.5. Provisions for Sealing.

Background/Discussion:
At its 2018 Grain Analyzer Sector meeting, the GA Sector agreed to a proposal to change the sealing requirements for NTEP grain moisture meters. Changes were proposed to NIST HB 44 Section 5.56(a) Table S.2.5. requiring all grain moisture meters have an event logger and meet the requirements that are associated with a Category 3 device after 2020. The Sector believed that due to the complexities of these devices, an event logger would be appropriate sealing. In addition, there are currently eight NTEP grain moisture meter and these meter except for one are equipped with an event logger.

At the 2019 Annual Meeting the S&T committee heard comments from NIST OWM that the GA Sector's proposal may lead to confusion as to when to apply the new requirements and encouraged the S&T committee to consider the NIST OWM proposal included in the OWM Analysis provided at the 2019 Annual Meeting. During the S&T committee meeting, members were unable to determine possible confusion in the existing proposal. A comment was made that a non-retroactive date was not included in the proposal and the committee selected a non-retroactive date of 2020.

The changes were adopted into the 2020 version of NIST HB 44. After further review it was noted that adding a nonretroactive date of 2020 caused an unintentional error. The table now only applied to devices manufactured or place into service after 2020 and the table no longer applied to devices that are currently in use.

At the 2019 Grain Analyzer Sector meeting the Sector discussed the error in the 2020 version of NIST HB 44, Section 5.56(a), Table S.2.5. and considered two proposal for changes to correct the error in NIST HB 44. A proposal to remove the nonretroactive date and italics from the table (see Below) and the proposal in the item under consideration.

Table S.2.5. Categories of Device and Methods of Sealing

Categories of Device		Method of Sealing
Category 1[1]:	No remote configuration capability	Seal by physical seal or two event counters: one for calibration parameters (000 to 999) and one for configuration parameters (000 to 999.) If equipped with event counters, the device must be capable of displaying, or printing through the device or through another on-site device, the contents of the counters.
Category 2[1]:	Remote configuration capability, but access is controlled by physical hardware. Device shall clearly indicate that it is in the remote configuration mode and shall	The hardware enabling access for remote communication must be at the device and sealed using a physical seal or two event counters; one for calibration parameters (000 to 999) and one for configuration parameters (000 to 999.) If equipped with event counters, the device must be capable of

	not be capable of operating in the measure mode while enabled for remote configuration.	displaying, or printing through the device or through another on-site device, the contents of the counters.
Category 3[2]: ~~Remote~~ Cconfiguration capability, access may be unlimited or controlled through a software switch (e.g. password.) When accessed for the purpose of modifying sealable parameters, the device shall clearly indicate that it is in the configuration mode and shall not be capable of operating in the measure mode.		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 (for calibration changes consisting of multiple constants, the calibration version number may be used rather than the calibration constants.) A printed copy of the information must be available through the device or through another on-site device. The event logger shall have a capacity to retain records equal to twenty-five (25) 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.)
[1] Not allowed for devices manufactured on or after January 1, 2020 [2] Required for all devices manufactured on or after January 1, 2020		

~~*Non-retroactive as of January 1, 2020.*~~
Amended 1998, 2013, 2019**, 2020**

The GA Sector received no objections or concerns to both proposals and agreed with the suggestion to remove the nonretroactive date and italics during the meeting. But, realizing errors that could be introduced by changing an existing table that applies to other devices in use, the Grain Analyzer Sector requested that this proposal be further reviewed at NIST and an appropriate proposal be sent to the Sector for ballot to be included on the 2020 NCWM S&T Agenda that would correct the error in the NIST HB 44 Section 5.56(a).

After review of the GA Sector's proposal to remove the nonretroactive date and italics from Table S.2.5, NIST, OWM provided the following comments and recommendations:

- Making changes to an existing sealing table that applies to many devices that are currently in use may inadvertently leave a gap in enforcement for these devices. Finding all gaps associated with these changes to the table is a timely process and all gaps may not be observed within the limited time frame to review changes before they are submitted in the current process for adoption into NIST HB 44.
- Dates with a non-retroactive status, address more than just the date to apply the requirement, a nonretroactive status also applies to those devices:
    - manufactured within a state after the effective date,
    - brought into a state after the effective date,
    - place into commercial service after the effective date, and
    - undergoing type evaluation, including devices that have been modified to the extent that a new NTEP certificate of Conformance (CC) is required.

  deleting a non-retroactive date may present a gap in how to apply the requirements to devices falling into one of these categories and including dates with only guidance of when to apply the requirement may also have gaps as to how to deal with devices falling into the categories mentioned.

- Regulatory jurisdictions have associated a Category 3 device as having remote configuration. Changes to this category of device may cause confusion in weights and measures jurisdictions. In addition, a philosophy for sealing has been published which recognizes Category 3 devices as those devices with remote configuration.
- As such, NIST OWM recommends keeping the 2019 NIST HB 44, Section 5.56(a) Table S.2.5 to address those devices currently in service.

Per the Grain Analyzer Sectors' requested that NIST, OWM technical advisor balloted the Sector with a proposal that provides appropriate changes to correct the error in the 2020 version of NIST HB 44 Section 5.56(a) Table S.2.5., The ballot was forwarded to the GA Sector and received 10 Affirm Votes and 1 Affirm vote with comments. The proposal is based on the 2020 version of NIST HB 44 that includes the following changes that were adopted into the 2020 version of NIST HB 44, Section 5.56.(a):

- adoption of paragraph G-S.8.2 that resulted in an update to Section 5.56(a) paragraph S.2.5.
- the adoption of changes to 5.56(a) Table S.2.5. which created an unintentional error of limiting NIST HB 44, Section 5.56 (a), Table S.2.5 to devices manufactured after 2020.

The proposal includes dates of when to apply sealing requirements. The format of this wording is consistent with wording used in NIST HB 44 Section 2.20. Scales code, Section S.2.1.3.

Regional Association Comments:
This item was submitted by the NTEP Grain Analyzer Sector following the fall 2019 regional meetings.

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

MDM – MULTIPLE DIMENSION MEASURING DEVICES

MDM-20.1 S.1.3. Negative Values, S.1.6. Customer Indications and Recorded Representations, S.1.7. Minimum Measurement, S.1.8. Indications Below Minimum and Above Maximum, S.2. Design of Zero ~~Tare~~Dimensional Offset and Appendix D – Definitions: dimensional offset

Background/Discussion:
At the May 2019 meeting of the Multiple Dimension Measuring Device (MDMD) Work Group, the members of the work group discussed the correctness of the use of the word 'tare' when referring to the removal of the height of a conveyance method (pallet, skid, etc.) for the purpose of obtaining a measurement of only the actual object intended to be transported. For example; a transportation company may want to place the object on a pallet to facilitate the ease of handling, however; the transportation company does not want the height of the pallet to be included in the cost calculations when determining the charge to the company requesting the transportation of the object.

The word 'tare', because of its extensive use and how it is applied in the weighing community, is always thought of as the removal of a weigh value from a gross weight value to obtain a net weight value. The function of removing a pallet or skid height from the total height of an object in the measuring field does not result in a net height, it results in measuring only the object sitting on the pallet.

The work group discussed topic in detail and as a result of the discussions, the members of the work group, including representatives from device manufacturers, device users, and NTEP evaluators, came to the conclusion that the word "tare" should be replaced with the term "dimensional offset".

Regional Association Comments:
WWMA 2019 Annual Meeting: No comments were heard during the open hearing session. The Committee agrees the item has merit and should be assigned a Voting status.

SWMA 2019 Annual Meeting: During Open Hearings the Committee heard comments from Russ Vires (Mettler Toledo) who supports the item as written. The Committee also heard comments from Dick Suiter (Richard Suiter Consulting, MDM Work Group Member) who clarified that the goal of the work group is to change the term "Tare" to "multi- dimensional offset."

After consideration of this item the Committee recommends this item move forward as a Voting Item

NEWMA 2019 Interim Meeting: The Committee and the body agree that this item should be moved to voting status. During open hearings, Mr. Dick Suiter (Richard Suiter Consulting), a MDMD WG member, commented that MDMD code was borrowed from Scale code using "tare" as a term. The MDMD doesn't use "tare" when determining measurements so the language change is a housekeeping item.

CWMA 2019 Interim Meeting: Mr. Dick Suiter (Richard Suiter Consulting) commented that this is a housekeeping item and it should move forward as voting. Mr. Doug Musick (KS) suggested that a definition of "Dimensional Offset" may need to be developed. We recommend this item as a voting item.

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

BLOCK 3 ITEMS (B3) TOLERANCES FOR DISTANCE TESTING IN TAXIMETERS AND TRANSPORTATION NETWORK SYSTEMS

B3: TXI-20.1 T. Tolerances
B3: TNS-20.1 T. Tolerances

Background/Discussion:

Taximeter manufacturers are submitting devices identical to the devices in the Transportation Network Measurement Systems code; however, they are faced with a tighter tolerance for over-registration. Both devices are typically computer pads or cell phones. Taximeter companies want to take advantage of some of the same technology used by TNMS companies, however, the tolerance for taximeters is much tighter than the tolerance for TNMS meters. During type evaluation, it is common to drive more than 1 mile to incorporate tunnels and valley effect. If the same tolerance was applied, taximeters would have the same chance of passing as TNMS meters.

Some jurisdictions that test taximeters may not want the tolerance for a 1-mile course to be raised given the good history of their test programs. This is the reason I am proposing maintaining the 1 % tolerance at 1 mile or less.

Some TNMS companies may be concerned that their device will not pass a 1 % tolerance, but we believe that on a straight, 1-mile course, devices operating properly should have no problem passing.

Regional Association Comments:

WWMA 2019 Annual Meeting: Mr. John Barton (NIST OWM) stated that the effort to align the TNMS Code with the Taximeters Code is appreciated and expressed the desire to merge the two codes in the future. Mr. Kurt Floren (L.A. County, CA) stated that he has concerns about the significant increase in the tolerance allowed for taximeters as proposed and that there is no data to support such a change. Mr. Clark Cooney (CA) stated that he agrees with Mr. Floren and encourages further development of this proposal. Mr. Stan Toy (Santa Clara County, CA) stated that he agrees with the previous comments heard and does not believe the tolerances for taximeters should be increased.

The Committee agrees that the item should be given a Developing status and that the submitter should work with the USNWG on Taximeters to incorporate the proposed changes into the appropriate HB 44 Codes.

SWMA 2019 Annual Meeting: The Committee heard no comments on this item. The Committee decided to make No Recommendation.

NEWMA 2019 Interim Meeting: The Committee and the body agree that this item should be moved to voting status. During open hearings, Mr. Jim Willis (NY) indicated that taxi meters are currently being held to tighter standard as compared to TNS and this proposal will align the tolerances in both codes. Mr. John McGuire (NJ) and Mr. James Cassidy (MA), voiced support.

CWMA 2019 Interim Meeting: Mr. Loren Minnich (KS) commented that this would give taxi's the same tolerances as TNS. We recommend this item as a voting item.

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

OTH – OTHER ITEMS

OTH-16.1 D Electric Watthour Meters Code under Development

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

Electric Vehicle Refueling Subgroup:
Ms. Tina Butcher, Chairman
NIST Office of Weights and Measures
P: (301) 975-2196
E: tbutcher@nist.gov
Or
Ms. Juana Williams, Technical Advisor
NIST Office of Weights and Measures
P: (301) 975-2196
E: juana.williams@nist.gov

Electric Watthour Meters Subgroup:
Ms. Lisa Warfield, Chairman
NIST Office of Weights and Measures
P: (301) 975-3308
E: lisa.warfield@nist.gov
Or
Ms. Tina Butcher, Technical Advisor
NIST Office of Weights and Measures
P: (301) 975-2196
E: tbutcher@nist.gov

This item was submitted as a Developing item to provide a venue to allow the USNWG to update the weights and measures community on continued work to develop test procedures and test equipment standards within its Electric Vehicle Refueling Subgroup. This item will also serve as a forum in which to report work on the development of a proposed tentative code for electric watthour meters in residential and business locations by the USNWG's Electric Watthour Meters Subgroup and a placeholder for its eventual submission for consideration by NCWM.

Mrs. Tina Butcher (NIST OWM), Chairman of the USNWG on Electric Refueling & Submetering has continued to provide regular updates to the Committee on this work. See the Committee's 2016 through 2018 Final Reports for details.

During the 2018 NCWM Interim Meeting, no comments were heard on this item and the Committee agreed to maintain its "Developing" status. The Committee did not take comments during open hearings on Developing items at the 2018 NCWM Annual Meeting and agreed to allow only the submitter of a Developing item (or block of Developing items) to provide an update on the progress made to further develop the item(s) since the 2018 NCWM Interim Meeting. The Committee received an update on this item from Mrs. Tina Butcher (OWM), Chair of the USNWG on Electric Refueling & Submetering. See the Committee's 2018 Final Report for Details.

OWM personnel were unable to attend the 2019 NCWM Interim Meeting due to the Federal Government shutdown in early 2019 due to a lack of appropriations; however, OWM provided written comments to the Committee on this item in the advance of the meeting, including the following update on this item:

- The Electric Watthour Meter Subgroup (EWH SG) of the USNWG on Electric Vehicle Fueling & Submetering has held multiple in-person and web meetings since the 2017 NCWM Annual Meeting.
- The SG met in September 2017, November 2017, May 2018, and August 2018. All meetings included web-conferencing to allow those not able to attend in person to participate.
- The SG developed a proposed addition to NIST Handbook 130's Uniform Regulation for the Method of Sale (MOS) of Commodities (see Item MOS-8 on the L&R Committee's Agenda) to specify a method of sale for electrical energy sold through these systems and submitted the proposal to the four regional weights and measures association meetings in Fall 2018.

- Three of the four regions recommend the MOS proposal on the L&R Agenda as a voting item, with the fourth abstaining due to lack of experience with these systems within the region.

- The SG continues work on a proposed code for EWH-type meters for NIST Handbook 44 and expects to have a draft ready for the 2020 NCWM cycle.
- OWM requests this item be maintained on the S&T Committee's agenda as a Developing Item while the SG finalizes its proposed HB 44 draft. OWM will continue to apprise the Committee of progress.
- At their Fall 2018 meetings, all four regional associations indicated support for maintaining this as a Developing item on the Committee's agenda.
- The SG will hold its next in-person meeting in February 2019 in Sacramento, CA. *(Technical Advisor's Note: This meeting was rescheduled to April 2019.)*
- Those interested in participating in this work please contact SG Chairman, Lisa Warfield, or Technical Advisor, Tina Butcher. Contact information is included at the beginning of this item.

At the 2019 NCWM Interim meeting, the Committee heard no comments on this item. At its work session, Committee members agreed with the submitter and the Regional Associations that this item should be assigned a Developing status.

During the 2019 NCWM Annual Meeting, Mrs. Tina Butcher (NIST OWM) provided the Committee with an update on the further development of this item. Mrs. Butcher reported that the EWH SG will meet next in August 2019 to continue its work and requested this item remain on the S&T Committee agenda as a Developing item. During the committee's work session, the Committee agreed with the submitter to retain this item in a Developing status.

Regional Association Comments:

WWMA 2019 Annual Meeting: Ms. Lisa Warfield (NIST OWM) provided the Committee with an update on the work group's efforts. Mr. Clark Cooney (CA) encouraged the support from WWMA for this proposal and appreciates the efforts of the work group developing the item. The Committee recommends that the submitter continue its efforts on the development of this item.

SWMA 2019 Annual Meeting: The Committee heard no comments on this item The Committee decided to make No Recommendation.

NEWMA 2019 Interim Meeting: The Committee and the body agree that this item should continue as a developing item. No comments were heard during open hearings.

CWMA 2019 Interim Meeting: We support the work of the USNWG on Electric Vehicle Fueling and Submetering and we recommend this item remain developing.

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

OTH-18.4 Appendix D – Definitions: batch (batching)

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

Mr. Loren Minnich
Kansas Department of Agriculture
(785) 209-2780, Loren.Minnich@ks.gov

The submitter of this item has reported to the Committee that 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.

The submitter asserts that to many weights & measures officials, it may seem obvious what is implied by the terms batch or batching however, 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.

The Committee did not take comments during open hearings on Developing items at the 2018 NCWM Annual Meeting and agreed to allow only the submitter of a Developing item (or block of Developing items) to provide an update on the progress made to further develop the item(s) since the 2018 NCWM Interim Meeting. There was no update provided by the submitter of this Developing item during the open hearings at 2018 NCWM Annual Meeting. Members of the Committee agreed to carryover this item on its 2019 agenda as a Developing item.

During the 2019 NCWM Interim Meeting, the Committee heard comments from Mr. Jim Pettinato, (TechnipFMC) who stated that there is at least one device that uses a *calculation* of the values measured when determining the total of a batching operation and is therefore not a *summation* of those values. Mr. Pettinato indicated he would be in favor of moving the item forward with a voting status if the words "the summation of" were removed from the proposed definition as follows:

batch (batching) - The combining or mixing of two or more materials or ingredients using weighing and/or measuring devices or systems to produce a finished product whose quantity is determined from ~~the summation of~~ those weights and/or measurements.

(Added 20XX)

The Committee agreed to amend the definition as requested and as shown in the Item Under Consideration and designated the item as "Voting."

NIST OWM submitted written comments to the Committee prior to the NCWM 2019 Interim Meeting. Those comments included OWM belief that the definition proposed in this item is an appropriate description of the process of batching however, that process is not dependent on any particular type of weighing/measuring device. Also in many batching operations, generic weighing/measuring devices are incorporated that may also be used in a variety of other applications. The design or available features offered by a particular device may be a factor in determining whether that device is suitable for use in any particular application. OWM therefore believes that the weighing/measuring device performance should be evaluated using existing requirements and tolerances that are not dependent on the device's use in a batching system.

OWM maintains that the definition of the term "batching" does not define any particular device and questions how this definition will promote consistency in the way these generic devices are evaluated. Also noted was that the submitter cites two sections of the NIST HB 44 Scales Code that explicitly address batching scales and specify requirements and tolerances for scales that are used for this purpose. OWM recognizes these two paragraphs in HB 44 Scales Code as archaic requirements that address particular types of weighing device**s** generally considered outmoded and possibly obsolete.

OWM also questions the benefit of the definition as purported by the submitter that it will "help manufacturers, users, and regulators determine when batching is metrologically significant." OWM requests a more complete explanation of the purpose of this proposal. Also noted is there are no references to device code(s) included in this proposed definition which prompts the question, in which codes is this proposed definition intended to apply?

At the 2019 NCWM Annual Meeting, Mr. Russ Vires (SMA) indicated that his organization opposes the item because batching is an application and not a type of device. Mr. Loren Minnich (KS) as the submitter agreed with the SMA, in that batching is an application, not a device type however. this item was developed in part due to the proposed and subsequently adopted batching systems definition. Mr. Minnich said that maybe the definition is not needed but there seems to be conflicting ideas of what batch or batching means. Having a definition would help jurisdictions interpret this application uniformly

Mr. Dmitri Karimov (MMA) opposes the item because "batch" is used to describe other processes that don't combine ingredients or commodities. In the context associated with the MMA, batching meters measure only water, and this definition would conflict with that use of the term.

Mr. Rick Harshman (NIST OWM) stated OWM does not agree with adding this definition to HB 44 for several reasons which are outlined in their analysis. Those reasons include the following:

- batching is an application for devices and not a device type;
- since the application of batching does not require a specific device type, those weighing devices used to batch can be properly evaluated utilizing current NIST Handbook 44 Scales Code requirements:
- OWM views the references made in this proposal referring to batching in HB 44 as outmoded and obsolete:
- the proposal does not state clearly how this definition would help officials properly evaluate devices used to batch: and
- the proposed definition is very similar to the definition for batching systems added to HB 44 in 2018.

NIST requests a more detailed explanation as to why this definition is necessary, and notes that the proposed definition doesn't include any numerical references to the sections it would apply to.

Mr. Charlie Stutesman (KS) supports this item because, as a stockman he buys feed that is sold by the individual commodity/ingredient, and it is important to make sure they are weighed correctly. Mr. Stutesman agrees it may need some tweaking but would like to see it move forward.

Regional Association Comments:

WWMA 2019 Annual Meeting: Mr. Russ Vires (SMA) stated that the SMA opposes this item because "batching" is a process and not a device. Mr. John Barton (NIST OWM) commented that the stated purpose of this item has not been met by the proposed changes. Also, that the term batching is an application of devices used in a process and should not be used in the context of a device specification. The Committee agrees that this proposed change is unnecessary and that the item should be withdrawn.

SWMA 2019 Annual Meeting: Russ Vires (SMA) opposed this item. He stated that he believes batching is an application, not a device type. Dick Suiter (Richard Suiter Consulting) stated that Batching goes beyond just a method.

The Committee recommends this item be Withdrawn. Based on discussion, batching is a process or a system, not a device.

NEWMA 2019 Interim Meeting: The Committee and the body agree that this item should be moved to developing status as we do not deem item to be fully developed. During open hearings, Mr. John McGuire (NJ) raised the concern that this definition could possibly be used for blending at retail motor fuel devices.

CWMA 2019 Interim Meeting: Mr. Loren Minnich (KS) commented that he is working on changes and requested the item be given a developing status. We recommend a developing status.

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

OTH-20.1 Appendix D – Definitions: submeter

Background-Discussion:

Changes being made to this definition up-dates the terminology being used in the Watthour Metering sections by the Working Groups Submeter watt-hour Subgroup. There has been confusion in some state jurisdictions causing the enforcement agency to believe that only a Utility could operate a sub metering system. A technical definition that does not use references to "Utility" which appears to be interpreted as allowed only if provided by the "Serving Utility". This definition also provides some technical consideration on how to categorize meters. UL/IEC/CSA61010-01 ED3 provides technical detail on where a meter can be in building wire infrastructure. This definition approach would make a clear distinction a specific meter's ability to be in various places in the wiring infrastructure, in technical terms and clear up whether it must be specifically provisioned by the "Serving Utility". The following excerpts are referenced from 61010-1© IEC:2010 Annex K identifying, technically, where meters of specific protection design can be. If there is another requirement to identify sales and service ownership and allowances, it is recommended that this be done elsewhere in the code.

- **OVERVOLTAGE CATEGORY IV** is for equipment installed at or near the origin of the electrical supply to a building, between the building entrance and the main distribution board. Such equipment may include electricity tariff meters and primary overcurrent protection devices. Manufacturers may also design equipment for OVERVOLTAGE CATEGORY IV when an even higher degree of reliability and availability is desired.
- **OVERVOLTAGE CATEGORY lll** is for equipment intended to form part of a building wiring installation. Such equipment includes socket outlets, fuse panels, and some MAINS installation control equipment. Manufacturers may also design equipment for OVERVOLTAGE CATEGORY III when a higher degree of reliability and availability is desired.
- **OVERVOLTAGE CATEGORY ll** is for equipment intended to be supplied from the building wiring. It applies both to plug-connected equipment and to PERMANENTLY CONNECTED EQUIPMENT. Sub-clause 6.7 covers only the requirements for OVERVOLTAGE CATEGORY ll with a nominal supply voltage up to 300 V. The requirements for higher OVERVOLTAGE CATEGORIES and for OVERVOLTAGE CATEGORY ll with a nominal supply voltage above 300 V are covered by this annex.
- **OVERVOLTAGE CATEGORY l** is used, within the context of IEC 60364-4-44, for equipment intended to be connected to a MAINS supply in which means have been taken to substantially and reliably reduce TRANSIENT OVERVOLTAGES to a level where they cannot cause a HAZARD.
- OVERVOLTAGE CATEGORY I is not relevant to this standard.

Generalizing the definition allows water, gas and other revenue billing categories of meter to be included. It does not express to ownership and operation of submeter. That should also be done elsewhere in the code.

The submitter commented that at this time the only opposing argument might be that a "Serving Utility" may react to not being in control of these devices. The code should also be clear in other areas besides the definition for understanding abilities to use a sub-metering for tariff billing down-stream of the mains meter.

Regional Association Comments:

WWMA 2019 Annual Meeting: Ms. Lisa Warfield (NIST OWM) stated that this item is fully developed and ready for a Voting status. Mr. Kevin Merritt (ID) asked if this language would apply to a LPG meter? Ms. Warfield responded that this does not apply to a LPG meter and that the definition for "submeter" referred to in this proposal should not be confused with the use of "master meter" as used when referring to calibrations. Mr. Kurt Floren (L.A. County, CA) asked the question "is the term master meter defined?" Ms. Warfield responded that the term "master meter" is defined and that the definition was derived from that definition from Measurement Canada.

The Committee agrees this proposal has merit and that it is fully developed and should be given a Voting status. The Committee also recognizes that the stated Purpose should be amended to state the change would affect to EVSE Code paragraph 3.40., Appendix D, Definitions as shown below.

~~**submeter.** A system furnished, owned, installed, and maintained by the customer who is served through a utility owned master meter. [3.40]~~

submeter - a meter or meter system downstream of the master meter. [3.40]
(Added 20XX)

SWMA 2019 Annual Meeting: The item was not submitted to this region.

NEWMA 2019 Interim Meeting: The item was not submitted to this region.

CWMA 2019 Interim Meeting: The item was not submitted to this region.

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