NEWMA Specifications and Tolerances (S&T) Committee
2016 Interim Meeting Report

Jane Zulkiewicz, Committee Chair
Town of Barnstable, Massachusetts

3000 INTRODUCTION

The Specifications and Tolerances (S&T) Committee (hereinafter referred to as "Committee") submits its Report to the Northeastern Weights and Measures Association (NEWMA). The Report consists of the NEWMA Agenda (NCWM Carryover and NEW items) and this Addendum. Page numbers in the tables below refer to pages in this Addendum. Suggested revisions to the handbook are shown in **bold face print** by ~~**striking out**~~ information to be deleted and **underlining** information to be added. Requirements that are proposed to be nonretroactive are printed in **bold-faced *italics.***

Presented below is a list of agenda items considered by the NEWMA and its recommendations to the NCWM Specifications and Tolerances Committee.

Subject Series List

Table A
Table of Contents

Appendices

Table B
Glossary of Acronyms and Terms

Acronym	Term	Acronym	Term
ABWS	Automatic Bulk Weighing System	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
MDMD	Multiple Dimension Measuring Device	VTM	Vehicle Tank Meter
NCWM	National Conference on Weights and Measures	WIM	Weigh-in-Motion
NEWMA	Northeastern Weights and Measures Association	WWMA	Western Weights and Measures Association

Details of All Items
(In order by Reference Key)

3100 – GENERAL CODE

New-1 G-S.5.2.2. Digital Indication and Representation (See related items New-2 and New-19)

Source:
Ross Andersen, Retired (2017)

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

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

G-S.5.2.2. Digital Indication and Representation. – Digital elements shall be so designed that:

(a) All digital values of like value in a system agree with one another.

(b) A digital value coincides with its associated analog value to the nearest minimum graduation.

(c) A digital value "rounds off" to the nearest minimum unit that can be indicated or recorded.

(d) A digital zero indication includes the display of a zero for all places that are displayed to the right of the decimal point and at least one place to the left. When no decimal values are displayed, a zero shall be displayed for each place of the displayed scale division.
[Nonretroactive as of January 1, 1986]

(e) A digital value that is electronically summed from the digital indications of multiple independent devices shall be mathematically correct.
[Nonretroactive as of January 1, 20XX]
(Amended 1973, and 1985**, and 20XX**)

Background/Discussion:
The submitter provided the following comments:

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

What stands out on this issue to me is the huge divide between the public sector and private sector on this issue. It was black and white in 1989, good guys vs the bad guys. The public sector, me included, saw the issue one way while the scale industry almost unilaterally saw it differently. As I think back over my career, I find it hard

to find a many issues where consensus between the two sides eluded the NCWM as it did for this issue. In my experience, the scale industry works toward consensus as earnestly as the public sector. If there is no consensus here, this should bother us all and encourage us to try to understand why.

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

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

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

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

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

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

A commodity exchanged in commerce may be measured:

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

them to be considered one instrument for applying code requirements. I believe the HB needs to say that explicitly to avoid confusion.

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

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

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

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

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

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

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

3.1.2 Calculated weight (Meeting 10, Decision 10)

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

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

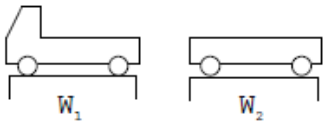
Any printout of the calculated weight values should be identified as calculated weight values.

(See also Sections 3.1.16 and 3.1.54)

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

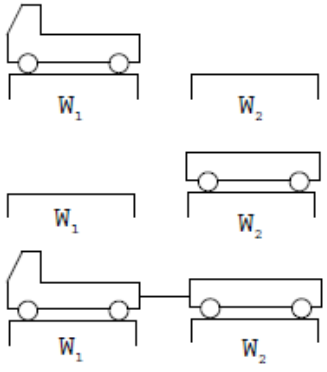
This concerns weight obtained by using adjacent weighbridges. Acceptable solutions, with examples, are shown below:

Two weighbridges, each with its own indicator:



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

Multi-plate weighbridge with one indicator:



W_1 = 30 t x 10 kg

W_2 = 30 t x 10 kg

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

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

(See also Sections 3.1.2 and 3.1.54)

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

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

(See also Sections 3.1.2 and 3.1.6)

3.1.6 Load cells

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

Item New-1
Summary of comments considered by the regional committee (in writing or during the open hearings):
The committee grouped Items 1, 2 and 19 together and heard comments simultaneously. Some comments were heard clarifying the purpose of the item. Other comments were heard recommending the item be developing.
Item as proposed by the regional committee: ***(If different than agenda item)***
Committee recommendation to the region: ☐ Voting Item on the NCWM Agenda ☐ Information Item on the NCWM Agenda ☐ Withdraw the Item from the NCWM Agenda (*In the case of new items, do not forward to NCWM)* ☒ Developing Item on the NCWM Agenda *(To be developed by source)*
Reasons for the committee recommendation:
The NEWMA S & T Committee feels this item has merit; however, the committee would like an example of how this applies to independent/multiple devices.
COMPLETE SECTION BELOW FOLLOWING VOTING SESSION
Final updated or revised proposal from the region: ***(If different than regional committee recommendation)***
Regional recommendation to NCWM for item status: ☐ Voting Item on the NCWM Agenda ☐ Information Item on the NCWM Agenda ☐ Withdraw the Item from the NCWM Agenda (*In the case of new items, do not forward to NCWM)* ☒ Developing Item on the NCWM Agenda *(To be developed by source)* ☐ Unable to consider at this time *(Provide explanation in the "Additional Comments" section below)*
Regional Report to NCWM: Please provide your report in this section exactly how you want it to appear in the NCWM reports to represent your region's considerations, support or opposition, and recommendations. **This will replace any previous reports from your region on this item.**
The NEWMA S & T Committee feels this item has merit; however, the committee would like an example of how this applies to independent/multiple devices.

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

New-6 G-UR.3.3. Position of Equipment

Source:
Illinois (2017)

Purpose:
Eliminate interpretation differences, while also demonstrating an apparent need for customer readability and giving the statutory authority permission to require visible indications for ease of test procedures.

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

G-UR.3.3. Position of Equipment. – A device or system equipped with a primary indicating element and used in direct sales, except for prescription scales, shall be positioned so that its indications may be accurately read and the weighing or measuring operation may be observed from some reasonable "customer" and "operator" position. The permissible distance between the equipment and a reasonable customer and operator position shall be determined in each case ~~**upon the basis of the individual circumstances**~~ **by the official with statutory authority, who shall base the determination on "customer readability" and ease of testing procedures,** particularly the size, character, and **position** of the indicating element. **(e.g., A deli customer shall be able to read the indications from the patron side of the deli counter, whereas a truck driver shall be able to read the indications from the cab of the vehicle.) (Also see G-UR.4.4. Assistance in Testing Operations. and Appendix D. direct sales.)**

Background/Discussion:
Over the years due to the verbiage of the current G-UR 3.3. regulation there has been a variety of different interpretations of what devices require outside indicating elements (e.g. scoreboards / remote indicators) and which do not. Some businesses believe that if they allow their customer to get out of their vehicles to come into the office/scale house that satisfies the regulation. Where as many inspectors, service people and customers believe that any device that requires indications to be accurately read from where the load-receiving element is located, needs to have such outside indicating elements installed.

With the terms more defined remote indicators / scoreboards would be required to be installed on most vehicle scales which would not only help the inspectors but would be a convenience for the service companies and in the long run save the businesses money due to the amount of time it takes to walk from the weigh load-receiving element to the indicating element. Safety is another important reason. Fewer drivers leaving their vehicle to verify indications would result in fewer accidents.

The cost of installing remote indicators / scoreboards is primarily the only reason against.

Item New-6
Summary of comments considered by the regional committee (in writing or during the open hearings):
There were comments wondering if this item was redundant as there are requirements already in HB44. It was determined that the item was valid, has merit and was ready for a vote.
Item as proposed by the regional committee: ***(If different than agenda item)***
Committee recommendation to the region: ☒ Voting Item on the NCWM Agenda ☐ Information Item on the NCWM Agenda ☐ Withdraw the Item from the NCWM Agenda (*In the case of new items, do not forward to NCWM)* ☐ Developing Item on the NCWM Agenda *(To be developed by source)*

Reasons for the committee recommendation:
Based on the comments heard, the NEWMA S & T Committee feels this item allows more stringent authority to the official requiring jewelry scale indicators to remote scoreboards at truck scale sites to be positioned for the customer.
COMPLETE SECTION BELOW FOLLOWING VOTING SESSION
Final updated or revised proposal from the region: ***(If different than regional committee recommendation)***
Regional recommendation to NCWM for item status: ☒ Voting Item on the NCWM Agenda ☐ Information Item on the NCWM Agenda ☐ Withdraw the Item from the NCWM Agenda (*In the case of new items, do not forward to NCWM)* ☐ Developing Item on the NCWM Agenda *(To be developed by source)* ☐ Unable to consider at this time *(Provide explanation in the "Additional Comments" section below)*
Regional Report to NCWM: Please provide your report in this section exactly how you want it to appear in the NCWM reports to represent your region's considerations, support or opposition, and recommendations. **This will replace any previous reports from your region on this item.**
Based on the comments heard, the NEWMA S & T Committee feels this item allows more stringent authority to the official requiring jewelry scale indicators to remote scoreboards at truck scale sites to be positioned for the customer.

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

3200 SCALES

New-7 S.1.2. Value of Scale Division Units and Appendix D – Definitions: batching scale

Source:
Richard Suiter Consulting (2017)

Purpose:
Recognize batching systems as a device type in the scales code to help officials differentiate between them and automatic bulk weighing systems.

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

S.1.2. ***Value of Scale Division Units.*** *– Except for batching scales**, batching systems** and **other** weighing systems used exclusively for weighing in predetermined amounts, the value of a scale division "d" expressed in a unit of weight shall be equal to:*

(a) 1, 2, or 5; or

(b) a decimal multiple or submultiple of 1, 2, or 5; or

Examples: scale divisions may be 10, 20, 50, 100; or 0.01, 0.02, 0.05; or 0.1, 0.2, 0.5, etc.

(c) a binary submultiple of a specific unit of weight.

Examples: scale divisions may be ½, ¼, ⅛, 1/16, etc.
[Nonretroactive as of January 1, 1986]

And amend NIST Handbook 44, Appendix D – Definitions as follows:

batching scale. – Any scale which by design or construction, lends itself readily to use in proportioning admixtures by weight. 2.20

Background/Discussion:
Item 360-3 on the 2015 Agenda of the NCWM S&T Committee was carried over as an Informational Item at the 2016 Annual Conference. The Item was opposed by the NIST OWM and the SMA because the scales code does not include the specific words "Batching System." The submitter of the item believed that the wording "batching scales and weighing systems" in paragraph S.1.2. was sufficient; however, the submitter agreed to work with the S&T Committee to submit an additional proposal to clarify the language. At the 2015 NCWM Interim meeting the SMA voice support for the definition for "batching system" and also suggested that a definition "batching scale" be added to Handbook 44, Appendix D. The proposed definition for batching scale is taken directly from the SMA book of "Terms and Definitions" published in their1981 Fourth Edition.

There are many batching scales and batching systems already in the market place some of which have an NTEP Certificate of Conformance. The proposed change to S1.2. and accompanying definitions will assist weights and measures official in identifying some devices as belonging in scales code for evaluation and testing purposes.

Some individuals believe that all automated systems utilizing a hopper scale belong in the Automatic Bulk Weighing Systems Code (ABWS). The submitter believes that NTEP and the Market Place have already demonstrated that there are devices and systems that do not need to meet some of the stringent requirements of the ABWS Code. These devices and systems are capable of providing accurate net weight without the necessity of some of the additional requirements of the ABWS Code. Those requirements add unnecessary additional manufacturing costs and testing burdens for weights and measures field officials.

Item New-7
Summary of comments considered by the regional committee (in writing or during the open hearings):
The committee grouped this item with 3600-2. Dick Suiter could not be here, he wrote an email asking for support on these items. There was a question wondering if there was a HB44 definition for batching systems. 3600-2 is the proposal definition for batching systems. No opposition to be moved as a voting item.
Item as proposed by the regional committee: ***(If different than agenda item)***
Committee recommendation to the region: ☒ Voting Item on the NCWM Agenda ☐ Information Item on the NCWM Agenda ☐ Withdraw the Item from the NCWM Agenda (*In the case of new items, do not forward to NCWM)* ☐ Developing Item on the NCWM Agenda *(To be developed by source)*
Reasons for the committee recommendation:
Mr. Suiter was asked by the NCWM S & T committee to clarify the language for the scales code, the NEWMA S & T Committee feels the language is pertinent to defining a batching scale.
COMPLETE SECTION BELOW FOLLOWING VOTING SESSION
Final updated or revised proposal from the region: ***(If different than regional committee recommendation)***

Regional recommendation to NCWM for item status:

- ☒ Voting Item on the NCWM Agenda
- ☐ Information Item on the NCWM Agenda
- ☐ Withdraw the Item from the NCWM Agenda (*In the case of new items, do not forward to NCWM)*
- ☐ Developing Item on the NCWM Agenda *(To be developed by source)*
- ☐ Unable to consider at this time *(Provide explanation in the "Additional Comments" section below)*

Regional Report to NCWM:

Please provide your report in this section exactly how you want it to appear in the NCWM reports to represent your region's considerations, support or opposition, and recommendations. **This will replace any previous reports from your region on this item.**

Mr. Suiter was asked by the NCWM S & T committee to clarify the language for the scales code, the NEWMA S & T Committee feels the language is pertinent to defining a batching scale.

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

New-8 S.1.2.2. Verification Scale Interval

Source:
Oregon (2017)

Purpose:
Reduce confusion for the buyer and seller by prohibiting the display of "d" smaller than "e" for Class I and II scales when used in direct sales.

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

S.1.2.2. Verification Scale Interval.

S.1.2.2.1. Class I and II Scales and Dynamic Monorail Scales. If $e \neq d$, the verification scale interval "e" shall be determined by the expression:

$$d < e \leq 10\ d$$

If the displayed division (d) is less than the verification division (e), then the verification division shall be less than or equal to 10 times the displayed division.

The value of e must satisfy the relationship, $e = 10^k$ of the unit of measure, where k is a positive or negative whole number or zero. This requirement does not apply to a Class I device with $d < 1$ mg where $e = 1$ mg. If $e \neq d$, the value of "d" shall be a decimal submultiple of "e," and the ratio shall not be more than 10:1. If $e \neq d$, and both "e" and "d" are continuously displayed during normal operation, then "d" shall be differentiated from "e" by size, shape, color, etc. throughout the range of weights displayed as "d."

(Added 1999)

S.1.2.2.2. Class I and II Scales used in Direct Sales. Class I and II scales used in direct sale applications, the Verification Scale Interval "e" shall be less than or equal to "d". (The disabling of the smaller "d" value may be selectable in menus and/or configuration selection)

(Added 20XX) ***(Nonretroactive as of January 1, 20XX)***

S.1.2.2.~~2~~3. 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." (Added 1999)

Background/Discussion:

With the massive increase of the direct sale of precious metals, cannabis and other high value commodities in the market place a large number of high-resolution scales are entering the market place. Many of these scales have a display that displays a "d" value that is smaller than the "e" value. This creates confusion for both parties in the transaction. The "d" value should not be used in any direct sale transaction since it is not evaluated during device examinations and is not considered during NTEP evaluations. Conflict ensues when one of the two parties demands that the "d" value be used in the transaction while the other party understanding the requirements of device refuses to do so. Should both parties agree to use the unvalidated "d" value the accuracy of the transaction is very much in doubt.

During performance testing of the device the evaluator essentially "ignores" the smallest displayed number when "d" is less than "e". This applies even when the "e" value would round up or down if the device were not displaying the smaller "d" value. This can lead to an evaluation that is potentially not as accurate as it could be.

Oregon officials have found rampant misuse of the unvalidated "d" value on devices that have a Verification Scale Interval of ("d" less than "e") when used in direct sale applications.

Item New-8
Summary of comments considered by the regional committee (in writing or during the open hearings):
There was concern that the wording in S.1.2.2.2 was incorrect. It states "*e*" must be less than or equal to "*d*", then later calls *d* "the smaller value". Appears to be conflicting language. Also concern about disabling *d*, are they allowed to do that now. Intent seems to be good but there is conflict. Requires further clarification and development.
Item as proposed by the regional committee: ***(If different than agenda item)***
Committee recommendation to the region: ☐ Voting Item on the NCWM Agenda ☐ Information Item on the NCWM Agenda ☐ Withdraw the Item from the NCWM Agenda (*In the case of new items, do not forward to NCWM)* ☒ Developing Item on the NCWM Agenda *(To be developed by source)*
Reasons for the committee recommendation:
The NEWMA S & T Committee recommends forwarding this item as developing and would like clarification on the "disabling" language in S.1.2.2.2.
COMPLETE SECTION BELOW FOLLOWING VOTING SESSION
Final updated or revised proposal from the region: ***(If different than regional committee recommendation)***
Regional recommendation to NCWM for item status: ☐ Voting Item on the NCWM Agenda ☐ Information Item on the NCWM Agenda ☐ Withdraw the Item from the NCWM Agenda (*In the case of new items, do not forward to NCWM)* ☒ Developing Item on the NCWM Agenda *(To be developed by source)* ☐ Unable to consider at this time *(Provide explanation in the "Additional Comments" section below)*
Regional Report to NCWM: Please provide your report in this section exactly how you want it to appear in the NCWM reports to represent your region's considerations, support or opposition, and recommendations. **This will replace any previous reports**

from your region on this item.
The NEWMA S & T Committee recommends forwarding this item as developing and would like clarification on the "disabling" language in S.1.2.2.2.

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

New-9 S.1.8.5. Recorded Representations, Point of Sale Systems and S.1.9.3. Recorded Representations, Random Weight Package Labels

Source:
Kansas, Minnesota, and Wisconsin (2017)

Purpose:
Provide verification to consumers through recorded representation that tare has been taken at point of sale for sales from bulk and on random weight package packages that are weighed and labeled in specialized areas of the store such as the meat department, bakery or deli.

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

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

(a) the net weight;[1]

(b) the gross weight or tare weight;[1]

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

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

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

[Non-retroactive January 1, 20XX]

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

And

S.1.9.3. Recorded Representations, Random Weight Package Labels. – A prepackaging scale or a device that produces a printed ticket as the label for a random weight package shall produce labels which must contain the following information:

(a) the net weight;[1]

(b) the gross weight or tare weight;[1]

(c) the unit price;[1]

(d) the total price; and

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

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

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

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

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

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

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

Item New-9
Summary of comments considered by the regional committee (in writing or during the open hearings):
Purpose of item is to make sure the tare is taken and to notify the consumer that the tare is taken. Major differences to POS operation. Nonretroactive would be difficult for industry. The committee heard comments saying that customers don't understand tare weights and this would only cause confusion. The proposal seems to want this

information on meat, bakery, seafood scales but then the author references cash registers which would not include these scales. Item recommended withdrawn at several suggestions.
Item as proposed by the regional committee: ***(If different than agenda item)***
Committee recommendation to the region: ☐ Voting Item on the NCWM Agenda ☐ Information Item on the NCWM Agenda ☒ Withdraw the Item from the NCWM Agenda (*In the case of new items, do not forward to NCWM)* ☐ Developing Item on the NCWM Agenda *(To be developed by source)*
Reasons for the committee recommendation:
The NEWMA S & T Committee recommends this item be withdrawn. The upgrade to POS systems, education to all store owners-large and small grocery stores, time to implement and confusion of the customer were some of the reasons for the committee's decision.
COMPLETE SECTION BELOW FOLLOWING VOTING SESSION
Final updated or revised proposal from the region: ***(If different than regional committee recommendation)***
Regional recommendation to NCWM for item status: ☐ Voting Item on the NCWM Agenda ☐ Information Item on the NCWM Agenda ☒ Withdraw the Item from the NCWM Agenda (*In the case of new items, do not forward to NCWM)* ☐ Developing Item on the NCWM Agenda *(To be developed by source)* ☐ Unable to consider at this time *(Provide explanation in the "Additional Comments" section below)*
Regional Report to NCWM: Please provide your report in this section exactly how you want it to appear in the NCWM reports to represent your region's considerations, support or opposition, and recommendations. **This will replace any previous reports from your region on this item.**
The NEWMA S & T Committee recommends this item be withdrawn. The upgrade to POS systems, education to all store owners-large and small grocery stores, time to implement and confusion of the customer were some of the reasons for the committee's decision.

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

New-19 Table 3, Parameters for Accuracy Classes (See related items New-1 and New-2)

Source:
Ross Andersen, Retired (2017)

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

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

Table 3.
Parameters for Accuracy Classes

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

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

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

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

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

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

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

Background/Discussion:
The submitter provided the following comments:

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

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

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

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

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

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

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

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

A commodity exchanged in commerce may be measured:

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

There is a small side issue regarding multiple devices using option C where the division size is not the same for all the devices. The general principle, i.e., that summing the indications from compliant devices is a valid way to measure a commodity, does not necessarily require that division sizes of the individual devices be identical. Note

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

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

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

3.1.2 Calculated weight (Meeting 10, Decision 10)

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

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

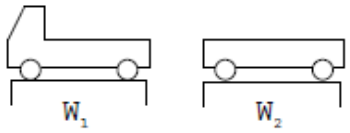
Any printout of the calculated weight values should be identified as calculated weight values.

(See also Sections 3.1.16 and 3.1.54)

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

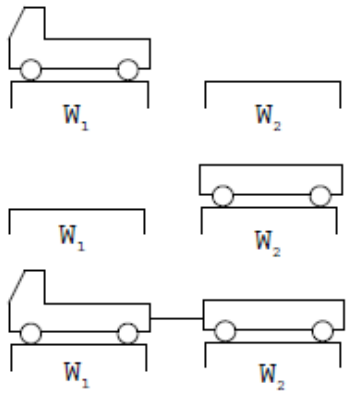
This concerns weight obtained by using adjacent weighbridges. Acceptable solutions, with examples, are shown below:

Two weighbridges, each with its own indicator:



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

Multi-plate weighbridge with one indicator:



W_1 = 30 t x 10 kg

W_2 = 30 t x 10 kg

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

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

(See also Sections 3.1.2 and 3.1.54)

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

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

(See also Sections 3.1.2 and 3.1.6)

3.1.6 Load cells

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

Item New-19
Summary of comments considered by the regional committee (in writing or during the open hearings):
The NEWMA S & T Committee grouped Items 1, 2 and 19 together and heard comments simultaneously. Some comments were heard clarifying the purpose of the item. Other comments were heard recommending the item be

developing.
Item as proposed by the regional committee: ***(If different than agenda item)***
Committee recommendation to the region: ☐ Voting Item on the NCWM Agenda ☐ Information Item on the NCWM Agenda ☐ Withdraw the Item from the NCWM Agenda (*In the case of new items, do not forward to NCWM)* ☒ Developing Item on the NCWM Agenda *(To be developed by source)*
Reasons for the committee recommendation:
The NEWMA S & T Committee feels this item has merit; however, the committee would like an example of how this applies to independent/multiple devices.
COMPLETE SECTION BELOW FOLLOWING VOTING SESSION
Final updated or revised proposal from the region: ***(If different than regional committee recommendation)***
Regional recommendation to NCWM for item status: ☐ Voting Item on the NCWM Agenda ☐ Information Item on the NCWM Agenda ☐ Withdraw the Item from the NCWM Agenda (*In the case of new items, do not forward to NCWM)* ☒ Developing Item on the NCWM Agenda *(To be developed by source)* ☐ Unable to consider at this time *(Provide explanation in the "Additional Comments" section below)*
Regional Report to NCWM: Please provide your report in this section exactly how you want it to appear in the NCWM reports to represent your region's considerations, support or opposition, and recommendations. **This will replace any previous reports from your region on this item.**
The NEWMA S & T Committee feels this item has merit; however, the committee would like an example of how this applies to independent/multiple devices.

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

New-10 N.1. Test Procedures

Source:
RAVAS Europe b.v. (2017)

Purpose:
Provide safe test procedures for 1-side supported mobile weighing systems such as forklift scales.

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

N.1.1. Increasing-Load Test. – The increasing-load test shall be conducted on all scales with the test loads approximately centered on the load-receiving element of the scale **or for forklift scales approximately centered on the load-gravity point as prescribed by the typeplate of the truck,** except on a scale having a nominal capacity greater than the total available known test load. When the total test load is less than the nominal capacity, the test load is used to greatest advantage by concentrating it, within prescribed load limits, over the main load supports of the scale.

N.1.2. Decreasing-Load Test (Automatic Indicating Scales). – The decreasing-load test shall be conducted with the test load approximately centered on the load-receiving element of the scale **or for forklift scales approximately centered on the load-gravity point as prescribed by the typeplate of the truck.**

N.1.3.2. Equal-Arm Scales. – A shift test shall be conducted with a half-capacity test load centered successively at four points positioned equidistance between the center and the front, left, back, and right edges of each pan as shown in the diagrams below. An equal test load shall be centered on the other pan.

For forklift scales front and back shift test shall be conducted with a half-capacity test load centered successively at the front and back edges of the pallet. For safety reasons the shift test shall not be performed for the left and right sides of the pallet since the pallet is hanging in the air and has no support on those sides.

Background/Discussion:
During a NTEP evaluation test a dangerous situation arose when the shift test for the left and right side were performed with half-capacity because the pallet on which the test weights were placed is not supported adequately in that direction and tends to tip over. To prevent accidents from happening with inspectors in the field the submitter advises to skip this side-shift test and concentrate on the front/back shift test because that's more in accordance with the practical use of the forklift truck.

Safety should be a priority. In practice forklifts are never loaded sideways because the load could be lost when turning the vehicle, possible damaging valuable goods.

Item New-10
Summary of comments considered by the regional committee (in writing or during the open hearings):
Testing method was determined to be outdated. Current updated method using chains and hoists (rather than weights on a pallet) is safe. Recommended for withdrawal.
Item as proposed by the regional committee: ***(If different than agenda item)***
Committee recommendation to the region: ☐ Voting Item on the NCWM Agenda ☐ Information Item on the NCWM Agenda ☒ Withdraw the Item from the NCWM Agenda (*In the case of new items, do not forward to NCWM)* ☐ Developing Item on the NCWM Agenda *(To be developed by source)*
Reasons for the committee recommendation:
The NEWMA S & T Committee believes the test procedures are adequate in this section.
COMPLETE SECTION BELOW FOLLOWING VOTING SESSION
Final updated or revised proposal from the region: ***(If different than regional committee recommendation)***
Regional recommendation to NCWM for item status: ☐ Voting Item on the NCWM Agenda ☐ Information Item on the NCWM Agenda ☒ Withdraw the Item from the NCWM Agenda (*In the case of new items, do not forward to NCWM)* ☐ Developing Item on the NCWM Agenda *(To be developed by source)* ☐ Unable to consider at this time *(Provide explanation in the "Additional Comments" section below)*
Regional Report to NCWM: Please provide your report in this section exactly how you want it to appear in the NCWM reports to represent your region's considerations, support or opposition, and recommendations. **This will replace any previous reports from your region on this item.**
The NEWMA S & T Committee believes the test procedures are adequate in this section.

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

New-21 T.1. General and T.N.2.1. General (See related items New-22, New-23, New-24, New-25, New-26 and New-27)

Source:
Ross Andersen, Retires (2017)

Purpose:
Provide language in this code that is consistent with the General Code.

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

T.1. General. – **The tolerances hereinafter prescribed shall be applied equally to errors of underregistration and errors of overregistration.** The tolerances applicable to devices not marked with an accuracy class shall have the tolerances applied as are as specified in Table T.1.1. Tolerances for Unmarked Scales.

T.N.2.1. General. – The tolerance values are positive (+) and negative (-) **hereinafter prescribed shall be applied equally to errors of underregistration and errors of overregistration** 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)

Background/Discussion:
The submitter provided the following comments:

General Code paragraph **G-T.3. Application** explains that tolerances in the Handbook are expressed either in excess/in deficiency or, on overregistration/on underregistration. For the most part, one of these two formats is used in each code as applicable. Specifically, one of the Tolerance paragraphs in each Code has a specific statement along the lines of:

The tolerances hereinafter prescribed shall be applied equally to errors of underregistration and errors of overregistration.
or
The tolerances hereinafter prescribed shall be applied equally to errors in excess and errors in deficiency.

However, I was reviewing tolerances in a few codes and noticed that there were codes that were not consistent with these two formats. I am proposing the S&T Committee amend the code where necessary to make all codes consistent with G-T.3. I have identified those codes in the table below. In all cases the tolerances are clearly meant to be or overregistration/underregistration in these codes, but the text in the code either has no specified format or just describes the tolerances as positive and negative.

2.20	Scales	Not specified & positive/negative
2.21	Belt-Conveyor	Not specified
2.24	AWS	positive/negative

2.25	Weigh-in-Motion	Not specified
5.58	MDMD	Not specified
5.59	Electronic Livestock, Meat, etc	Not specified

I note that describing tolerances as positive and negative is relative and can mean different things to different people. One person's plus can be another's minus. That is not a desirable situation. The use of "in excess," "in deficiency, "on overregistration," or "on underregistration" eliminate that ambiguity.

Note that our convention in the US is to express LMD errors as errors in delivery while most other codes we express errors in indication. G-T.3. is referring solely to errors in indication. For example, a dispenser test at 5 gal that is in error by -3 in^3 is overregistering. In contrast a scale test at 5 lb that is in error by -0.03 lb is underregistering. The distinction is most critical when the code does not apply tolerances equally to overregistration and underregistration.

It turns out the codes that do not specify the tolerance application format all apply the tolerances equally to overregistration/underregistration, so I believe these changes would be entirely editorial. I would further recommend that any "+/-" designation in the tolerance values or tables be eliminated as they are redundant and inconsistent with the principles in G-T.3.

In a related item, I believe it is necessary to bring the definition of overregistration/underregistration in line with modern measurement terminology. The definition now uses the expression "true value" in its examples. My understanding is that expression "true value" is highly discouraged mainly because no one knows what it really is. I am suggesting that we replace "true value" with "verified value" as indicated below. I opted for verified since we added the term verification to the HB44 definitions just a few years ago.

The proposed changes would make the Handbook treatment of tolerances consistent with G.T.3. It might be possible to make these changes editorially if the Committee agrees. However, because the deadline for proposals for the 2017 cycle nears, I am submitting this as a formal proposal.

Item New-2

Summary of comments considered by the regional committee (in writing or during the open hearings):

The NEWMA S & T Committee grouped Items 21, 22, 23, 24, 25, 26, 27 together and heard comments simultaneously to match these codes, scales code, belt conveyor code, automatic weighing systems, electronic livestock, meat and poultry evaluations systems with the general code G-T.3. Comment was heard that for lack of an adequate explanation, keep developing and allow the author a chance to explain and justify. The committee agreed and recommends as developing.

Item as proposed by the regional committee: ***(If different than agenda item),***

Committee recommendation to the region:

- ☐ Voting Item on the NCWM Agenda
- ☐ Information Item on the NCWM Agenda
- ☐ Withdraw the Item from the NCWM Agenda (*In the case of new items, do not forward to NCWM)*
- ☒ Developing Item on the NCWM Agenda *(To be developed by source)*

Reasons for the committee recommendation:

The NEWMA S & T Committee feels this proposal has merit with making language uniform but the interpretation when applying errors of overregistration and errors of underregistration; in excess/in deficiency could lead to confusion.

COMPLETE SECTION BELOW FOLLOWING VOTING SESSION

Final updated or revised proposal from the region: ***(If different than regional committee recommendation)***

Regional recommendation to NCWM for item status:

- ☐ Voting Item on the NCWM Agenda
- ☐ Information Item on the NCWM Agenda
- ☐ Withdraw the Item from the NCWM Agenda (*In the case of new items, do not forward to NCWM)*
- ☒ Developing Item on the NCWM Agenda *(To be developed by source)*
- ☐ Unable to consider at this time *(Provide explanation in the "Additional Comments" section below)*

Regional Report to NCWM:

Please provide your report in this section exactly how you want it to appear in the NCWM reports to represent your region's considerations, support or opposition, and recommendations. **This will replace any previous reports from your region on this item.**

The NEWMA S & T Committee feels this proposal has merit with making language uniform but the interpretation when applying errors of overregistration and errors of underregistration; in excess/in deficiency could lead to confusion.

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

3201 BELT-CONVEYOR SCALE SYSTEMS

New-22 T.1. Tolerance Values (See related items New-21, New-23, New-24, New-25, New-26 and New-27)

Source:
Ross Andersen, Retired (2017)

Purpose:
Provide language in this code that is consistent with the General Code.

Item under Consideration:
Amend NIST Handbook 44 Belt-Conveyor Scale Systems Code as follows**:**

> **T.1. Tolerance Values.[1] - <u>The tolerances hereinafter prescribed shall be applied equally to errors of underregistration and errors of overregistration.</u>** Maintenance and acceptance tolerances on material tests, relative to the weight of the material, shall be ±0.25% of the test load.
>
> (Amended 1993)

[Note the ±is stricken near the end of the second sentence.]

Background/Discussion:
The submitter provided the following comments:

> General Code paragraph **G-T.3. Application** explains that tolerances in the Handbook are expressed either in excess/in deficiency or, on overregistration/on underregistration. For the most part, one of these two formats is used in each code as applicable. Specifically, one of the Tolerance paragraphs in each Code has a specific statement along the lines of:

The tolerances hereinafter prescribed shall be applied equally to errors of underregistration and errors of overregistration.
or
The tolerances hereinafter prescribed shall be applied equally to errors in excess and errors in deficiency.

However, I was reviewing tolerances in a few codes and noticed that there were codes that were not consistent with these two formats. I am proposing the S&T Committee amend the code where necessary to make all codes consistent with G-T.3. I have identified those codes in the table below. In all cases the tolerances are clearly meant to be or overregistration/underregistration in these codes, but the text in the code either has no specified format or just describes the tolerances as positive and negative.

2.20	Scales	Not specified & positive/negative
2.21	Belt-Conveyor	Not specified
2.24	AWS	positive/negative
2.25	Weigh-in-Motion	Not specified
5.58	MDMD	Not specified
5.59	Electronic Livestock, Meat, etc	Not specified

I note that describing tolerances as positive and negative is relative and can mean different things to different people. One person's plus can be another's minus. That is not a desirable situation. The use of "in excess," "in deficiency, "on overregistration," or "on underregistration" eliminate that ambiguity.

Note that our convention in the US is to express LMD errors as errors in delivery while most other codes we express errors in indication. G-T.3. is referring solely to errors in indication. For example, a dispenser test at 5 gal that is in error by -3 in^3 is overregistering. In contrast a scale test at 5 lb that is in error by -0.03 lb is underregistering. The distinction is most critical when the code does not apply tolerances equally to overregistration and underregistration.

It turns out the codes that do not specify the tolerance application format all apply the tolerances equally to overregistration/underregistration, so I believe these changes would be entirely editorial. I would further recommend that any "+/-" designation in the tolerance values or tables be eliminated as they are redundant and inconsistent with the principles in G-T.3.

In a related item, I believe it is necessary to bring the definition of overregistration/underregistration in line with modern measurement terminology. The definition now uses the expression "true value" in its examples. My understanding is that expression "true value" is highly discouraged mainly because no one knows what it really is. I am suggesting that we replace "true value" with "verified value" as indicated below. I opted for verified since we added the term verification to the HB44 definitions just a few years ago.

The proposed changes would make the Handbook treatment of tolerances consistent with G.T.3. It might be possible to make these changes editorially if the Committee agrees. However, because the deadline for proposals for the 2017 cycle nears, I am submitting this as a formal proposal.

Item New-22
Summary of comments considered by the regional committee (in writing or during the open hearings):
The NEWMA S & T Committee grouped Items 21, 22, 23, 24, 25, 26, 27 together and heard comments simultaneously to match these codes, scales code, belt conveyor code, automatic weighing systems, electronic livestock, meat and poultry evaluations systems with the general code G-T.3. Comment was heard that for lack of an adequate explanation, keep developing and allow the author a chance to explain and justify. The committee agreed and recommends as developing.
Item as proposed by the regional committee: ***(If different than agenda item)***

Committee recommendation to the region:

- ☐ Voting Item on the NCWM Agenda
- ☐ Information Item on the NCWM Agenda
- ☐ Withdraw the Item from the NCWM Agenda (*In the case of new items, do not forward to NCWM)*
- ☒ Developing Item on the NCWM Agenda *(To be developed by source)*

Reasons for the committee recommendation:

The NEWMA S & T Committee feels this proposal has merit with making language uniform but the interpretation when applying errors of overregistration and errors of underregistration; in excess/in deficiency could lead to confusion.

COMPLETE SECTION BELOW FOLLOWING VOTING SESSION

Final updated or revised proposal from the region: ***(If different than regional committee recommendation)***

Regional recommendation to NCWM for item status:

- ☐ Voting Item on the NCWM Agenda
- ☐ Information Item on the NCWM Agenda
- ☐ Withdraw the Item from the NCWM Agenda (*In the case of new items, do not forward to NCWM)*
- ☒ Developing Item on the NCWM Agenda *(To be developed by source)*
- ☐ Unable to consider at this time *(Provide explanation in the "Additional Comments" section below)*

Regional Report to NCWM:

Please provide your report in this section exactly how you want it to appear in the NCWM reports to represent your region's considerations, support or opposition, and recommendations. **This will replace any previous reports from your region on this item.**

The NEWMA S & T Committee feels this proposal has merit with making language uniform but the interpretation when applying errors of overregistration and errors of underregistration; in excess/in deficiency could lead to confusion.

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

3202 AUTOMATIC BULK WEIGHING SYSTEMS

3202-1 D A. Application, S Specifications, N. Notes, UR. User Requirements

Source:
Kansas (2016)

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

Item under Consideration:
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 bulk commodity without human intervention.**~~**predetermined amounts automatically recording the no-load and loaded weight values and accumulating the net weight of each draft.**~~
(Amended 1987)

S. Specifications

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

S.1.1. Zero Indication. – ~~**Provisions**~~ **An Automatic Bulk Weighing System (ABWS)** shall ~~**be made to**~~indicate and record a no-load reference value and, if the no-load reference value is a zero value indication, to indicate and record an out-of-balance condition on both sides of zero.

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

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

S.1.7 No Load Reference Values – An ABWS shall indicate and record weight values with no load in the load-receiving element. No load reference values must be recorded at a point in time after product flow from the load receiving element is stopped and before product flow into the load receiving element has started. Systems may be designed to stop operating if a no load reference value falls outside of user designated parameters. If this feature is designed into the system then the no load reference value indicated when the system is stopped must be recorded, an alarm must activate, weighing must be inhibited, and some type of human intervention must be required to restart the system after it is stopped.

S.1.8 Loaded Weight Values – An ABWS shall indicate and record loaded weight values for each weighment.

S.1.9 Net Weight Values – An ABWS shall calculate and record net weight for each weighment.

S.1.10 Net Weight Accumulation – An ABWS shall automatically accumulate and record the sum of all net weight values for each weighing process.

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

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

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

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

(b) The recording element **can only ~~cannot print~~ record** a weight if **~~either of the gates~~ equipment controlling product flow to or from the load-receiving element is in a condition that allows product to enter or leave the load receiving element. ~~leading directly to or from the weigh hopper is open.~~**

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

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

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

[Nonretroactive as of January 1, 1998]
(Amended 1997)

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

UR. User Requirements

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

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

Doug Musick
Kansas Department of Agriculture
785-564-6681
dmusick@kda.ks.gov

Background/Discussion:

The submitter provided the following points of discussion:

- There are many systems in use that don't meet the definition for a "scale" or an "Automatic Bulk Weighing System" or anything else in the Handbook. These changes will make it easier for regulators/inspectors to determine if a system should be evaluated as an "ABWS".
- The wording "automatic bulk weighing systems" should not be used in the definition of the same.
- The no load and loaded weight recordings are important, but they are specifications and should not be included in the application code.
- The current code does not clearly define at what level of automation a system would be considered an ABWS versus a scale with some accessory equipment (hopper, tank, etc.). This is an attempt to more clearly distinguish which systems should be considered ABWS's.
- Human intervention could be many things. Some examples include but are not limited to pushing a reset button, turning power off then back on, typing a password, or entering a statement into a system log. The intent with including the term "human intervention" is to not include all systems which have a high degree of automation, only the ones that cycle repeatedly and can potentially operate without anyone present to observe weighing malfunctions.
- There are many types of load receiving elements that will work with an ABWS to include but not limited to tanks and hoppers so the previous language referring to hoppers was removed and replaced with the generic but accurate term "load receiving element".
- The old language implied separate sensors (e.g. bindicators) were required. Newer systems have already bypassed the use of separate sensors and utilize the weight indications to identify an overfilled condition, similar to how the indications are used to regulate product flow into the load receiving element for some devices. Concerns for this approach have been raised for situations when an indicator is not functioning properly. That is a legitimate concern, but my reply then is: What is the backup for an indicator not indicating properly on any other type of device? This is something we know happens with other devices and commonly may not be detected until a device inspection and test is completed. Thus one reason routine inspections and testing are required.
- Many types of equipment can be used to control the flow of product into and out of a load receiving element automatically including but not limited to gates, conveyors, augers, robots, pipes, tubes, elevators, and buckets. Examples would be a conveyer delivering product – in such a case the recording element should not record if the conveyer is still moving or in the case of a pneumatic transfer tube the recording element should not record if the blower forcing air through the tube is still operating. Therefore, the old language referring to gates was removed and replace with more generic terminology which can be applied to any equipment used to control product flow not just gates.
- Many types of equipment can be used for downstream commodity storage including but not limited to hoppers, tanks, bins, flat storage, trucks, totes, rail cars and pits. The language referring to "lower garner", "surge bin", etc. has been removed and replaced with a more terms such as "downstream storage devices" to allow for all potentials types of product handling equipment.
- A downstream storage device itself may not interfere with the weighing process directly, but it also cannot create a situation in which an overfill condition or some other malfunction of the equipment interferes with the weighing process. An example would be a grain storage hopper located under a weigh hopper in a position which when grain is mounded up above the storage hopper the grain touches the bottom of the weigh hopper and interferes with the weighing process. For this example, if the storage hopper can be lowered far enough below the weigh hopper so that the mounded grain when it reaches its' maximum potential height cannot touch the weigh hopper then it would not need the capability to detect an overfill condition. The same scenario would apply to a truck parked under the load receiving element, or a conveyer under the load receiving element. Wording was added to ensure interference does not occur and if it does that the system activates controls to prevent weighment errors.

The original code was written for very specific equipment for a very specialized use. This is a fairly drastic change from the original and introduces some new terminology that may present some confusion or uncertainty to those who were fairly familiar with the existing code. Some individuals feel the proposed changes may add some uncertainty as to what systems should or shouldn't be considered an ABWS.

2016 NCWM Interim Meeting:
At the Committee's 2016 Interim Meeting open hearings, Mr. Russ Vires (Mettler-Toledo, LLC) speaking on behalf of the SMA commented that SMA looks forward to the further clarification of this item.

Mrs. Tina Butcher (OWM) noted the single-most important factor in determining whether or not an automated weighing system needs to take into account the no-load reference and gross-load reference to determine an accurate net weight for individual drafts weighed is the system's ability to consistently return to zero following discharge of the load. This determination must be made on a case-by-case basis and will vary depending on the design of the system and the products being weighed.

OWM recognizes the need for HB 44 to include requirements that address some ***automated*** weighing systems currently in the marketplace that, for one reason or another, fail to meet the definition of an ABWS or the application of the ABWS Code. As is the case with an ABWS, these systems are also used to weigh bulk commodities in an automatic operation. A number of these weighing systems do ***not*** consistently return to zero following discharge of a draft load due to:

- the density of the commodity being weighed and its susceptibility to cling;
- structural deformations in the load-receiving element (which trap and prevent product from being completely discharged);
- venting issues;
- system vibration; etc.

Mrs. Butcher noted, for example, that OWM is aware of *some* seed treatment systems that will automatically fill to some targeted load (preset by the system operator) by weighing multiple drafts *automatically* and *without* operator intervention. Similar automated systems used to weigh other products are also known to exist. When these systems are operational, not all of the weighed product necessarily gets discharged with the draft load. The remaining product is typically referred to as a "heel." Some of these systems only record the gross weight of the different drafts weighed; yet, the "heel" remaining for each draft load cycled through the system needs to be taken into account for an accurate determination of the net quantity to be made. OWM believes this proposal is an attempt to address such systems. Mrs. Butcher also acknowledged the existence of weighing systems that ***do*** consistently return to zero following discharge of the product when being operated in automatic mode. She stated that for these systems, the Scales Code is intended to apply.

Mrs. Butcher further reported that OWM believes more work is needed to develop the proposal. She suggested that the submitter might propose that the definition of "automatic bulk weighing systems" be amended to apply to systems that weigh bulk commodities in an automatic operation, but because of their design, fail to meet the current definition and the existing code. Proposed amendments to the ABWS Code could then be developed to address such systems.

Mr. Doug Musick (KS) noted that the current proposal is an initial attempt to update the current ABWS Code to address some newer automated weighing systems known to exist in the marketplace. He reported that some of these newer systems aren't able to comply with the existing ABWS Code, which provides indication of the need to update the current code. He agreed with OWM that more work was needed to further develop the proposal and requested additional input and assistance from those willing to provide it.

The Committee agreed that more work was needed to develop the item and assigned it a "Developing" status. The Committee recommends that the item's submitter review the 2015 SWMA S&T Annual Report for additional proposed revisions to the proposal by that region's S&T Committee.

Regional Association Comments:
CWMA believed this item has merit and the comments received were in support of it but recommended that it remain a Developing item.

NEWMA received comments that this item needs more work; NEWMA recommended that it remain a Developing item.

SWMA received comments regarding potential unintended consequences as well as editorial changes the Committee considered necessary. Comments have been provided to the submitter by a member and the Committee looks for further development of the item. SWMA forwarded the item to NCWM with recommended changes shown below and recommended that it be a Developing item.

A. Application

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

S. Specifications

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

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

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

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 ~~ABWS~~** shall indicate and record weight values with no load in the load-receiving element. No load reference values must be recorded at a point in time after product flow from the load receiving element is stopped and before product flow into the load receiving element has started. Systems may be designed to stop operating if a no load reference value falls outside of user designated parameters. If this feature is designed into the system then the no load reference value indicated when the system is stopped must be recorded, an alarm must activate, weighing must be inhibited, and some type of **operator ~~human~~** intervention must be required to restart the system after it is stopped.

S.1.8 Loaded Weight Values – An **automatic bulk weighing system ~~ABWS~~** shall indicate and record loaded weight values for each weighment.

S.1.9 Net Weight Values – An **automatic bulk weighing system ~~ABWS~~** shall calculate and record net weight for each weighment.

S.1.10 Net Weight Accumulation – An **automatic bulk weighing system ~~ABWS~~** shall automatically accumulate and record the sum of all net weight values for each weighing process.

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

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

buckets, etc.

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

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

(b) The recording element can only ~~cannot print~~ record a weight if ~~either of the gates~~ equipment controlling product flow to or from the load-receiving element is in a condition that allows product to enter or leave the load receiving element. ~~leading directly to or from the weigh hopper is open.~~

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

(a) The system must have a means to detect when ~~T~~the ~~weigh hopper~~load-receiving element ~~shall be equipped with an~~is overfilled. 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 ~~human~~** intervention must be required to restart the system. An alarm could be many things including a flashing light, siren, horn, flashing computer screen, etc. The intent of an alarm is to make the operator aware there is a problem which needs corrected.
(Added 1993)

(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 ~~human~~** intervention is required to restart the system.~~be equipped with an overfill sensor which will cause the gate of the weigh hopper to remain open, activate an alarm, and inhibit weighing until the overfill condition has been corrected.~~

[Nonretroactive as of January 1, 1998]
(Amended 1997)

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

UR. User Requirements

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

Item: 3202-1
Summary of comments considered by the regional committee (in writing or during the open hearings):
No comments were heard on this item. Committee designates as developing.
Item as proposed by the regional committee: ***(If different than agenda item)***
Committee recommendation to the region: ☐ Voting Item on the NCWM Agenda ☐ Information Item on the NCWM Agenda ☐ Withdraw the Item from the NCWM Agenda (*In the case of new items, do not forward to NCWM)* ☒ Developing Item on the NCWM Agenda *(To be developed by source)*
Reasons for the committee recommendation:
The NEWMA S & T Committee forwards this item as developing.
COMPLETE SECTION BELOW FOLLOWING VOTING SESSION
Final updated or revised proposal from the region: ***(If different than regional committee recommendation)***
Regional recommendation to NCWM for item status: ☐ Voting Item on the NCWM Agenda ☐ Information Item on the NCWM Agenda ☐ Withdraw the Item from the NCWM Agenda (*In the case of new items, do not forward to NCWM)* ☒ Developing Item on the NCWM Agenda *(To be developed by source)* ☐ Unable to consider at this time *(Provide explanation in the "Additional Comments" section below)*
Regional Report to NCWM: Please provide your report in this section exactly how you want it to appear in the NCWM reports to represent your region's considerations, support or opposition, and recommendations. **This will replace any previous reports from your region on this item.**
The NEWMA S & T Committee forwards this item as developing.

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

3204 AUTOMATIC WEIGHING SYSTEMS

New-23 T.N.2.1. General (See related items New-21, New-22, New-24, New-25, New-26 and New-27)

Source:
Ross Andersen, Retired (2017)

Purpose:
Provide language in this code that is consistent with the General Code.

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

T.N.2.1. General. – The tolerance values ~~**are positive (+) and negative (-)**~~ **hereinafter prescribed shall be applied equally to errors of underregistration and errors of overregistration** 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)

Background/Discussion:
The submitter provided the following comments:

General Code paragraph **G-T.3. Application** explains that tolerances in the Handbook are expressed either in excess/in deficiency or, on overregistration/on underregistration. For the most part, one of these two formats is used in each code as applicable. Specifically, one of the Tolerance paragraphs in each Code has a specific statement along the lines of:

The tolerances hereinafter prescribed shall be applied equally to errors of underregistration and errors of overregistration.
or
The tolerances hereinafter prescribed shall be applied equally to errors in excess and errors in deficiency.

However, I was reviewing tolerances in a few codes and noticed that there were codes that were not consistent with these two formats. I am proposing the S&T Committee amend the code where necessary to make all codes consistent with G-T.3. I have identified those codes in the table below. In all cases the tolerances are clearly meant to be or overregistration/underregistration in these codes, but the text in the code either has no specified format or just describes the tolerances as positive and negative.

2.20	Scales	Not specified & positive/negative
2.21	Belt-Conveyor	Not specified
2.24	AWS	positive/negative
2.25	Weigh-in-Motion	Not specified
5.58	MDMD	Not specified
5.59	Electronic Livestock, Meat, etc	Not specified

I note that describing tolerances as positive and negative is relative and can mean different things to different people. One person's plus can be another's minus. That is not a desirable situation. The use of "in excess," "in deficiency, "on overregistration," or "on underregistration" eliminate that ambiguity.

Note that our convention in the US is to express LMD errors as errors in delivery while most other codes we express errors in indication. G-T.3. is referring solely to errors in indication. For example, a dispenser test at 5 gal that is in error by -3 in^3 is overregistering. In contrast a scale test at 5 lb that is in error by -0.03 lb is underregistering. The distinction is most critical when the code does not apply tolerances equally to overregistration and underregistration.

It turns out the codes that do not specify the tolerance application format all apply the tolerances equally to overregistration/underregistration, so I believe these changes would be entirely editorial. I would further recommend that any "+/-" designation in the tolerance values or tables be eliminated as they are redundant and inconsistent with the principles in G-T.3.

In a related item, I believe it is necessary to bring the definition of overregistration/underregistration in line with modern measurement terminology. The definition now uses the expression "true value" in its examples. My understanding is that expression "true value" is highly discouraged mainly because no one knows what it really is. I am suggesting that we replace "true value" with "verified value" as indicated

below. I opted for verified since we added the term verification to the HB44 definitions just a few years ago.

The proposed changes would make the Handbook treatment of tolerances consistent with G.T.3. It might be possible to make these changes editorially if the Committee agrees. However, because the deadline for proposals for the 2017 cycle nears, I am submitting this as a formal proposal.

Item New-23
Summary of comments considered by the regional committee (in writing or during the open hearings):
The NEWMA S & T Committee grouped Items 21, 22, 23, 24, 25, 26, 27 together and heard comments simultaneously to match these codes, scales code, belt conveyor code, automatic weighing systems, electronic livestock, meat and poultry evaluations systems with the general code G-T.3. Comment was heard that for lack of an adequate explanation, keep developing and allow the author a chance to explain and justify. The committee agreed and recommends as developing.
Item as proposed by the regional committee: ***(If different than agenda item)***
Committee recommendation to the region: ☐ Voting Item on the NCWM Agenda ☐ Information Item on the NCWM Agenda ☐ Withdraw the Item from the NCWM Agenda (*In the case of new items, do not forward to NCWM)* ☒ Developing Item on the NCWM Agenda *(To be developed by source)*
Reasons for the committee recommendation:
The NEWMA S & T Committee feels this proposal has merit with making language uniform but the interpretation when applying errors of overregistration and errors of underregistration; in excess/in deficiency could lead to confusion.
COMPLETE SECTION BELOW FOLLOWING VOTING SESSION
Final updated or revised proposal from the region: ***(If different than regional committee recommendation)***
Regional recommendation to NCWM for item status: ☐ Voting Item on the NCWM Agenda ☐ Information Item on the NCWM Agenda ☐ Withdraw the Item from the NCWM Agenda (*In the case of new items, do not forward to NCWM)* ☒ Developing Item on the NCWM Agenda *(To be developed by source)* ☐ Unable to consider at this time *(Provide explanation in the "Additional Comments" section below)*
Regional Report to NCWM: Please provide your report in this section exactly how you want it to appear in the NCWM reports to represent your region's considerations, support or opposition, and recommendations. **This will replace any previous reports from your region on this item.**
The NEWMA S & T Committee feels this proposal has merit with making language uniform but the interpretation when applying errors of overregistration and errors of underregistration; in excess/in deficiency could lead to confusion.

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

3205 WEIGH-IN-MOTION SYSTEMS USED FOR VEHICLE ENFORCEMENT SCREENING

3205-1 A. Application. and Sections Throughout the Code to Address Commercial and Law Enforcement Applications

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

Purpose:
To recognize a higher accuracy class and appropriate requirements in the Weighing-In-Motion Tentative Code to add commercial and law enforcement applications. In particular, scales meeting the higher accuracy classes would be permitted for use in commercial applications and for highway law enforcement.

Item under Consideration:
Amend NIST Handbook 44, Weigh-In-Motion Systems Tentative Code as follows:

A.1. General. – This code applies to systems used to weigh vehicles~~,~~ while in motion~~.~~**.**

(a) For the purpose of screening and sorting the vehicles based on the vehicle weight to determine if a static weighment is necessary.
(b) For commercial legal for trade applications.
(c) For direct law enforcement applications.

A.2. Axle-Load Scales – The requirements for axle-load scales apply to such scales in official use for the enforcement of traffic and highway laws or for the collection of statistical information by government agencies and axle-load scales that meet the requirements of the Tentative Code for commercial use.

A.~~2~~ 3. The code does not apply to weighing systems intended **only** for the collection of statistical traffic data.

A.~~3~~ 4. Additional Code Requirements. – In addition to the requirements of this code, Weigh-In-Motion ~~Screening~~ Systems shall meet the requirements of Section 1.10. General Code.

S. Specifications

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

S.1.1. Ready Indication. – The system shall provide a means of verifying that the system is operational and ready for use.

S.1.2. Value of System Division Units. – The value of a system division "d" expressed in a unit of weight shall be equal to:

(a) 1, 2, or 5; or

(b) a decimal multiple or submultiple of 1, 2, or 5.

Examples: divisions may be 10, 20, 50, 100; or 0.01, 0.02, 0.05; or 0.1, 0.2, 0.5, etc.

S.1.2.1. Units of Measure. – The system shall indicate weight values using only a single unit of measure.

S.1.3. Maximum Value of Division Size. – ~~The value of the system division "d" for a Class A, Weight-In-Motion System shall not be greater than 50 kg (100 lb).~~

(a) The value of the system division "d" for a Class A, Weigh-In-Motion System shall not be greater than 50 kg (100 lb).
(b) The value of the system division for "d" for a Class B or III L, Weigh-In-Motion System shall not be greater than 10kg (20lb).

S.1.4. Value of Other Units of Measure.

S.1.4.1. Speed. – Vehicle speeds shall be measured in miles per hour or kilometers per hour.

S.1.4.2. Axle-Spacing (Length). – **If applicable** ~~T~~**t**he center-to-center distance between any two successive axles shall be measured in:

(a) feet and inches;
(b) feet and decimal submultiples of a foot; or
(c) meters and decimal submultiples of a meter.

S.1.4.3. Vehicle Length. – If the system is capable of measuring the overall length of the vehicle, the length of the vehicle shall be measured in feet and/or inches, or meters.

S.1.5. Capacity Indication. – An indicating or recording element shall not display nor record any values greater than 105% of the specified capacity of the load receiving element.

S.1.6. Identification of a Fault. – Fault conditions shall be presented to the operator in a clear and unambiguous means. The following fault conditions shall be identified:

(a) Vehicle speed is below the minimum or above the maximum speed as specified.
(b) The maximum number of vehicle axles as specified has been exceeded.
(c) A change in vehicle speed greater than that specified has been detected.

S.1.7. Recorded Representations.

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:

(a) transaction identification number;
(b) lane identification (required if more than one lane at the site has the ability to weigh a vehicle in-motion);
(c) vehicle speed;
(d) number of axles;
(e) weight of each axle;
(f) **if applicable** identification and weight of axles groups;
(g) **if applicable** axle spacing;
(h) total vehicle weight;
(i) all fault conditions that occurred during the weighing of the vehicle;
(j) **if applicable** violations, as identified in paragraph S.2.1., that occurred during the weighing of the vehicle; and
(k) time & date.

S.1.8. Value of the Indicated and Recorded System Division. – The value of the system's division "(d)", as recorded, shall be the same as the division value indicated.

S.2. System Design Requirements.

S.2.1. Violation Parameters. – **If applicable,** ~~T~~**t**he instrument shall be capable of accepting user entered violation parameters for the following items:

(a) single axle weight limit;
(b) axle group weight limit;
(c) gross vehicle weight limit; and
(d) bridge formula maximum.

The instrument shall display and or record violation conditions when these parameters have been exceeded.

S.3. Design of Weighing Elements.

S.3.1. Multiple Load-Receiving Elements. –An instrument with a single indicating or recording element, or a combination indicating-recording element, that is coupled to two or more load-receiving elements with independent weighing systems, shall be provided with means to prohibit the activation of any load-receiving element (or elements) not in use, and shall be provided with automatic means to indicate clearly and definitely which load receiving element (or elements) is in use.

S.4. Design of Weighing Devices, Accuracy Class.

S.4.1. Designation of Accuracy. – ~~WIM Systems meeting the requirements of this code shall be designated as accuracy Class A.~~

(a) WIM Systems for screening and sorting, meeting the requirements of this code shall be designated as accuracy Class A.
(b) WIM Systems for commercial and law enforcement applications, meeting the requirements of this code shall be designated.

(1) Class III L for the dynamic gross vehicle weight calculations
(2) Class B for dynamic law enforcement applications

Note: This does not preclude ~~higher~~ **other** accuracy classes from being proposed and added to this Code in the future when it can be demonstrated that WIM systems grouped within those accuracy classes can achieve the ~~higher~~ level of accuracy specified for those devices.

S.5. Marking Requirements. – In addition to the marking requirements in G-S.1. Identification (except G.S.1.(e)), the system shall be marked with the following information:

(a) Accuracy Class;
(b) Value of the System Division "d";
(c) Operational Temperature Limits;
(d) Number of Instrumented Lanes (not required if only one lane is instrumented.);
(e) Minimum and Maximum Vehicle Speed;
(f) Maximum Number of Axles per Vehicle;
(g) Maximum Change in Vehicle Speed during Weighment; and
(h) Minimum and Maximum Load.

S.5.1. Location of Marking Information. – The marking information required in G-S.1. of the General Code and S.5. shall be visible after installation. The information shall be marked on the system or recalled from an information screen.

N. Notes

N.1. Test Procedures.

N.1.1. Selection of Test Vehicles. – All dynamic testing associated with the procedures described in each of the subparagraphs of N.1.5 shall be performed with a minimum of two test vehicles.

(a) The first test vehicle may be a two axle, six tire, single unit truck; that is, a vehicle with two axles with the rear axle having dual wheels. The vehicle shall have a ~~maximum~~ **minimum** Gross Vehicle Weight of 10,000 lbs.
(b) The second test vehicle shall be a ~~five axle,~~ single trailer truck with a maximum Gross Vehicle Weight of
80,000 lbs.

Note: Consideration should be made for testing the systems using vehicles which are typical to the systems daily operation.

N.1.1.1. Weighing of Test Vehicles. – All test vehicles shall be weighed on a reference scale before being used to conduct the dynamic tests.

N.1.1.2. Determining Reference Weights for Axle, Axle Groups and Gross Vehicle Weight. – The reference weights shall be the average weight value of a minimum of three static weighments of all single axle, axle groups and gross vehicle weight.

Note: The axles within an axle group **weighed only as an axle group** are not considered single axles.

N.1.2. Test Loads.

N.1.2.1. Static Test Loads. – All static test loads shall use certified test weights

N.1.2.2. Dynamic Test Loads. – Test vehicles used for dynamic testing shall be loaded to 85 to 95% of their legal maximum Gross Vehicle Weight **or as typical in normal use.** The "load" shall be non-shifting and shall be positioned to present as close as possible, an equal side-to-side load.

~~**N.1.3. Reference Scale.** – Each reference vehicle shall be weighed statically on a multiple platform vehicle scale comprised of three individual weighing/load-receiving elements, each an independent scale. The three individual weighing/load receiving elements shall be of such dimension and spacing to facilitate 1) the single-draft weighing of all reference test vehicles, and 2) the simultaneous weighing of each single axle and axle group of the reference test vehicles on different individual elements of the scale; gross vehicle weight determined by summing the values of the different reference axle and reference axle groups of a test vehicle. The scale shall be tested immediately prior to using it to establish reference test loads and in no case more than 24 hours prior. To qualify for use as a suitable reference scale, it must meet NIST Handbook 44, Class III L maintenance tolerances.~~

N.1.3. Reference Scale. – Each reference vehicle shall be weighed statically on a certified scale to determine the Gross Vehicle Weight. To qualify for use as a suitable reference scale, it must meet NIST Handbook 44, Class III L maintenance tolerances. The scale shall be tested immediately prior to using it to establish reference test loads and in no case more than 24 hours prior.

(a) For law enforcement applications the reference vehicle shall be weighed on a certified multiple platform vehicle scale comprised of three individual weighing/load-receiving elements, each an independent scale. The three individual weighing/load receiving elements shall be of such dimension and spacing to facilitate 1) the single-draft weighing of all reference test vehicles, and 2) the simultaneous weighing of each single axle and axle group of the reference test vehicles on different individual elements of the scale; gross vehicle weight determined by summing the values of the different reference axle and reference axle groups of a test vehicle.

Note: If the distance to an off-site reference scale will significantly impact the accuracy of the reference weights then the scale under test may be used as the reference scale.

(b) For commercial applications for the gross vehicle weight calculations only, the reference vehicle shall be weighed statically on either the same scale, a certified multiple platform vehicle scale or a single platform vehicle scale with sufficient length to accommodate single draft weighing of the reference vehicle

N.1.3.1. Location of a Reference Scale. – The location of the reference scale must be considered as vehicle weights
will change due to fuel consumption.

N.1.4. Test Speeds. – All dynamic tests shall be conducted within 20% **above the rated minimum and 20%** below **the rated maximum speed limits.**

N.1.5. Test Procedures. For law enforcement scales.

N.1.5.1. Static Test Procedures. - For Type Approval Evaluation and initial verification the axle-load scale designed for commercial use shall be tested statically to Handbook 44 Class III Tolerances. For subsequent verification the scale will be tested to Handbook 44 Class III L maintenance tolerances.

N.1.5.~~1~~2. Dynamic Load Test. – The dynamic test shall be conducted using the test vehicles defined in N.1.1. The test shall consist of a minimum of 20 runs for each test vehicle at the speed as stated in N.1.4.

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.

N.1.5.~~2~~3. Vehicle Position Test. – During the conduct of the dynamic testing ensure that the vehicle stays within the defined roadway along the width of the sensor. The test shall be conducted with 10 runs with the vehicle centered along the width of the sensor, 5 runs with the vehicle on the right side along the width of the sensor, and 5 runs with the vehicle on the left side along the width of the sensor. Only gross vehicle weight is used for this test and the tolerance for each weighment shall be based on the tolerance value specified in T.2.3.

N.1.5.~~3~~4. Axle Spacing Test. – The axle spacing test is a review of the displayed and/or recorded axle spacing distance of the test vehicles. The tolerance value for each distance shall be based on the tolerance value specified in T.2.4.

N.1.6. Test Procedure for Commercial Gross Vehicle Weight Calculation Scales.

N.1.6.1. As-Used Test Procedures. – A weighing system shall be tested in a manner that represents the normal method of operation.

N.1.6.2. Static Test Procedures. - For Type Approval Evaluation and initial verification the axle-load scale designed for commercial use shall be tested statically to Handbook 44 Class III Tolerances. For subsequent verification the scale will be tested to Handbook 44 Class III L maintenance tolerances.

N.1.6.3. Dynamic Test. – The dynamic test shall be conducted using the test vehicles defined in N.1.1. The test shall consist of a minimum of 5 runs for each test vehicle at the speed as stated in N.1.4.

At the conclusion of the dynamic test there will be a minimum of 5 weight readings for the gross vehicle weight of the test vehicle. The tolerance for each weight reading shall be based on Handbook 44 Class III L maintenance tolerances.

T. Tolerances

T.1. Principles.

T.1.1. Design. – The tolerance for a weigh-in-motion system is a performance requirement independent of the design principle used.

T.2. Tolerance Values for Accuracy Class A.

T.2.1. To Tests Involving Digital Indications or Representations – To the tolerances that would otherwise be applied in paragraphs T.2.2 and T.2.3, there shall be added an amount equal to one-half the value of the scale division to account for the uncertainty of digital rounding.

T.2.2. Tolerance Values for Dynamic Load Tests for **Screening and Sorting devices.** – The tolerance values applicable during dynamic load testing are as specified in Table T.2.2

Table T.2.2. – Tolerance 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.	

T.2.3. Tolerance Value for Vehicle Position Test. – The tolerance value applied to each gross vehicle weighment is ±10% of the applied test load.

T.2.4. Tolerance Value for Axle Spacing. – The tolerance value applied to each axle spacing measurement shall be ± 0.15 meter (0.5 feet).

T.3. Tolerance Values for Dynamic Weighing Systems Used Commercially and for Direct Law Enforcement. -The tolerance values applicable during dynamic load testing are as specified in Table T.2.2

Table T.3. – Tolerance for Commercial and Law Enforcement Dynamic Scales.	
Load Description	**Tolerance as a Percentage of Applied Test Load**
Axle Load	**±0.5%**
Axle Group Load	**±1%**
Gross Vehicle Weight	**Class III L Maintenance Tolerance**

T.~~3~~.4. Influence Factors. – The following factors are applicable to tests conducted under controlled conditions only.

T.~~3~~4.1. Temperature. – Systems shall satisfy the tolerance requirements under all operating temperature unless a limited operating temperature range is specified by the manufacturer.

T.4~~5~~. Radio Frequency Interference (RFI) and Other Electromagnetic Interference Susceptibility. – The difference between the weight indication due to the disturbance and the weight indication without the disturbance shall not exceed the tolerance value as stated in Table T.2.2. **or Table T.3 as applicable.**

UR. USER REQUIREMENTS

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 and minimum capacity.

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	**Dynamic law enforcement axle, axle group and gross vehicle weight.**
III L	**Commercial and direct law enforcement**
Note: A WIM system with a higher accuracy class than that specified as "typical" may be used.	

UR.2. User Location Conditions and Maintenance. – The system shall be installed and maintained as defined in the manufacturer's recommendation.

UR.2.1. System Modification. – The dimensions (e.g., length, width, thickness, etc.) of the load receiving element of a system shall not be changed beyond the manufacturer's specifications, nor shall the capacity of a scale be increased beyond its design capacity by replacing or modifying the original primary indicating or recording element with one of a higher capacity, except when the modification has been approved by a competent engineering authority, preferably that of the engineering department of the manufacturer of the system, and by the weights and measures authority having jurisdiction over the system.

UR.2.2. Foundation, Supports, and Clearance. – The foundation and supports shall be such as to provide strength, rigidity, and permanence of all components.

On load-receiving elements which use moving parts for determining the load value, clearance shall be provided around all live parts to the extent that no contacts may result when the load-receiving element is empty, nor throughout the weighing range of the system.

UR.2.3. Access to Weighing Elements. – If necessary, adequate provision shall be made for inspection and maintenance of the weighing elements.

UR.2.4. Axle-Load Scales Approaches. – At each end of an axle-load scale there shall be a straight, paved, and level 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 on the approaches throughout the weighing process.

UR.3. Maximum Load. – A system shall not be used to weigh a load of more than the marked maximum load of the system.

Background/Discussion:
The proposed requirements are based in part on requirements in OIML R 134, **"Automatic instruments for weighing road vehicles in motion and measuring axle loads."** Test data and experience at multiple test sites demonstrate this system can meet the performance requirements that are proposed.

2016 NCWM Interim Meeting:
During the 2016 NCWM Interim Meeting, Mr. John Lawn (Rinstrum, Inc.) presented a short slide presentation on a slow speed WIM system that Rinstrum, Inc., manufactures. Mr. Lawn explained that he had originally hoped the proposal could be considered for vote in 2016, but had decided to request it move forward as "Developing" in 2016 to allow time for Rinstrum to address some of the concerns that had been raised through the review process and to better familiarize the weights and measures community with the equipment. He also indicated that he understood the need for Rinstrum to provide data in support of their claim that the equipment is capable of conforming to the tolerances specified in the proposal. Rinstrum's plan going forward is to amend the current proposal to address all the issues and have a new proposal ready in time that it can be considered for vote in 2017.

Mrs. Tina Butcher (OWM) noted that the adoption of this proposal would, for the first time ever, make it permissible for WIM vehicle systems installed in the U.S. to be used not only for direct law-enforcement applications, but also for commercial applications. She further explained that while OWM encourages the expansion of the code to recognize such applications, the proposal needs to be thoroughly vetted by all the different parties affected by the changes being proposed, including (but not necessarily limited to):

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

The submitter and others have acknowledged the proposal needs a considerable amount of additional development before it is ready to move forward for vote. Mrs. Butcher recommended the proposal remain in a "developing" status until such time that the WIM WG or other representative group has reviewed and considered its merits.

Mrs. Butcher further reported that in OWM's analysis of this item, there were several areas identified as needing additional development to include:

- The procedures developed by the WIM WG for establishing reference test loads for testing WIM systems used in law enforcement screening may not provide the level of accuracy needed (i.e., combined error and uncertainty less than one-third applicable tolerance) for testing commercial and law-enforcement WIMs given the more stringent tolerances proposed for these applications.
- Studies have shown that axle and tandem axle weights fluctuate depending on the positon of a truck on a scale. How will this be addressed in the procedures for establishing the reference test loads for testing axle and axle-groups?

- Under what conditions are officials willing to accept a single tolerance (i.e. Class IIIL Maintenance tolerance) for commercial applications?
- Why is there not an acceptance tolerance proposed? Is it because the amount of error in the WIM system is not expected to change as a result of routine, continued use?
- If a single tolerance is accepted, will this be limited to certain applications?

She also noted that as the proposal is further developed, additional changes to format and structure of the code may be needed to clearly delineate requirements for commercial WIM applications from those used for law-enforcement.

Mr. Russ Vires (Mettler-Toledo, LLC) speaking on behalf of the SMA reported that the SMA opposes the inclusion of these changes in the Weigh-In-Motion for Vehicle Enforcement Screening Code. The SMA supports the idea identified, but feels additional clarification and development is required.

A couple of regulatory officials commented in support of maintaining the "Developing" status of the proposal.

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

Regional Association Comments:
CWMA believed this item has merit and the comments received were in support of it but recommended that it remain a Developing item.

NEWMA recommended that this item remain a Developing item.

SWMA believes this item has merit but needs further development. SWMA forwarded it to NCWM, recommending that it be a Developing item.

Item: 3205-1
Summary of comments considered by the regional committee (in writing or during the open hearings):
Carried over from National, no comments heard. No objections to remain developing.
Item as proposed by the regional committee: ***(If different than agenda item)***
Committee recommendation to the region: ☐ Voting Item on the NCWM Agenda ☐ Information Item on the NCWM Agenda ☐ Withdraw the Item from the NCWM Agenda (*In the case of new items, do not forward to NCWM)* ☒ Developing Item on the NCWM Agenda *(To be developed by source)*
Reasons for the committee recommendation:
The NEWMA S & T Committee forwards this item as developing.
COMPLETE SECTION BELOW FOLLOWING VOTING SESSION
Final updated or revised proposal from the region: ***(If different than regional committee recommendation)***
Regional recommendation to NCWM for item status: ☐ Voting Item on the NCWM Agenda ☐ Information Item on the NCWM Agenda ☐ Withdraw the Item from the NCWM Agenda (*In the case of new items, do not forward to NCWM)* ☒ Developing Item on the NCWM Agenda *(To be developed by source)* ☐ Unable to consider at this time *(Provide explanation in the "Additional Comments" section below)*
Regional Report to NCWM: Please provide your report in this section exactly how you want it to appear in the NCWM reports to represent your region's considerations, support or opposition, and recommendations. **This will replace any previous reports from your region on this item.**

The NEWMA S & T Committee forwards this item as developing.

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

New-24 T.1.1. Design (See related items New-21, New-22, New-23, New-25, New-26 and New-27)

Source:
Ross Andersen, Retired (2017)

Purpose:
Provide language in this code that is consistent with the General Code.

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

> **T.1.1. Design.** - The tolerances for a weigh-in-motion system is a performance requirement independent of the design principle used. **The tolerances hereinafter prescribed shall be applied equally to errors of underregistration and errors of overregistration**.

Background/Discussion:
The submitter provided the following comments:

> General Code paragraph **G-T.3. Application** explains that tolerances in the Handbook are expressed either in excess/in deficiency or, on overregistration/on underregistration. For the most part, one of these two formats is used in each code as applicable. Specifically, one of the Tolerance paragraphs in each Code has a specific statement along the lines of:
>
> The tolerances hereinafter prescribed shall be applied equally to errors of underregistration and errors of overregistration.
> or
> The tolerances hereinafter prescribed shall be applied equally to errors in excess and errors in deficiency.
>
> However, I was reviewing tolerances in a few codes and noticed that there were codes that were not consistent with these two formats. I am proposing the S&T Committee amend the code where necessary to make all codes consistent with G-T.3. I have identified those codes in the table below. In all cases the tolerances are clearly meant to be or overregistration/underregistration in these codes, but the text in the code either has no specified format or just describes the tolerances as positive and negative.

2.20	Scales	Not specified & positive/negative
2.21	Belt-Conveyor	Not specified
2.24	AWS	positive/negative
2.25	Weigh-in-Motion	Not specified
5.58	MDMD	Not specified
5.59	Electronic Livestock, Meat, etc	Not specified

I note that describing tolerances as positive and negative is relative and can mean different things to different people. One person's plus can be another's minus. That is not a desirable situation. The use of "in excess," "in deficiency, "on overregistration," or "on underregistration" eliminate that ambiguity.

Note that our convention in the US is to express LMD errors as errors in delivery while most other codes we express errors in indication. G-T.3. is referring solely to errors in indication. For example, a dispenser test at 5 gal that is in error by -3 in^3 is overregistering. In contrast a scale test at 5 lb that is in error by -0.03 lb is underregistering. The distinction is most critical when the code does not apply tolerances equally to overregistration and underregistration.

It turns out the codes that do not specify the tolerance application format all apply the tolerances equally to overregistration/underregistration, so I believe these changes would be entirely editorial. I would further recommend that any "+/-" designation in the tolerance values or tables be eliminated as they are redundant and inconsistent with the principles in G-T.3.

In a related item, I believe it is necessary to bring the definition of overregistration/underregistration in line with modern measurement terminology. The definition now uses the expression "true value" in its examples. My understanding is that expression "true value" is highly discouraged mainly because no one knows what it really is. I am suggesting that we replace "true value" with "verified value" as indicated below. I opted for verified since we added the term verification to the HB44 definitions just a few years ago.

The proposed changes would make the Handbook treatment of tolerances consistent with G.T.3. It might be possible to make these changes editorially if the Committee agrees. However, because the deadline for proposals for the 2017 cycle nears, I am submitting this as a formal proposal.

Item New-24
Summary of comments considered by the regional committee (in writing or during the open hearings):
The NEWMA S & T Committee grouped Items 21, 22, 23, 24, 25, 26, 27 together and heard comments simultaneously to match these codes, scales code, belt conveyor code, automatic weighing systems, electronic livestock, meat and poultry evaluations systems with the general code G-T.3. Comment was heard that for lack of an adequate explanation, keep developing and allow the author a chance to explain and justify. The committee agreed and recommends as developing.
Item as proposed by the regional committee: ***(If different than agenda item)***
Committee recommendation to the region: ☐ Voting Item on the NCWM Agenda ☐ Information Item on the NCWM Agenda ☐ Withdraw the Item from the NCWM Agenda (*In the case of new items, do not forward to NCWM)* ☒ Developing Item on the NCWM Agenda *(To be developed by source)*
Reasons for the committee recommendation:
The NEWMA S & T Committee feels this proposal has merit with making language uniform but the interpretation when applying errors of overregistration and errors of underregistration; in excess/in deficiency could lead to confusion.
COMPLETE SECTION BELOW FOLLOWING VOTING SESSION
Final updated or revised proposal from the region: ***(If different than regional committee recommendation)***

Regional recommendation to NCWM for item status:

- ☐ Voting Item on the NCWM Agenda
- ☐ Information Item on the NCWM Agenda
- ☐ Withdraw the Item from the NCWM Agenda (*In the case of new items, do not forward to NCWM)*
- ☒ Developing Item on the NCWM Agenda *(To be developed by source)*
- ☐ Unable to consider at this time *(Provide explanation in the "Additional Comments" section below)*

Regional Report to NCWM:

Please provide your report in this section exactly how you want it to appear in the NCWM reports to represent your region's considerations, support or opposition, and recommendations. **This will replace any previous reports from your region on this item.**

The NEWMA S & T Committee feels this proposal has merit with making language uniform but the interpretation when applying errors of overregistration and errors of underregistration; in excess/in deficiency could lead to confusion.

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

3300 LIQUID MEASURING DEVICES

New-13 S.2.1. Vapor Elimination (See related items New-14, New-15, New-16 and New-17)

Source:
Liquid Controls and NIST OWM (2017)

Purpose:
Align other measuring device codes with the changes adopted in S&T LPG & NH_3 Code Item 332-3 (S.2.1. Vapor Elimination).

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

S.2.1. Vapor Elimination.

(a) A liquid-measuring device shall be equipped with **an effective,** ~~**a vapor or air eliminator or other**~~ automatic means to prevent the passage of vapor and air through the meter.

(b) Vent lines from the air or vapor eliminator shall be made of **appropriate non-collapsible** ~~**metal tubing or other rigid**~~ material.

(Amended 1975 **and 2017**)

S.2.1.1. Vapor Elimination on Loading Rack Metering Systems.

(a) A loading rack metering system shall be equipped with **an effective,** ~~**a vapor or air eliminator or other**~~ automatic means to prevent the passage of vapor and air through the meter unless the system is designed or operationally controlled by a method, approved by

the weights and measures jurisdiction having control over the device, such that air and/or vapor cannot enter the system.

(b) Vent lines from the air or vapor eliminator (if present) shall be made of **appropriate non-collapsible** ~~**metal tubing or other rigid**~~ material.

(Added 1994)
(Amended 2017)

Background/Discussion:
The proposed changes would ensure consistency across the various measuring device codes in NIST Handbook 44. This would help ensure more uniform interpretation of the requirements and facilitate application by officials and industry.

The proposed changes will align other codes with the following changes that were made to the LPG code at the 2016 NCWM Annual Meeting.

S.2.1. Vapor Elimination. –

(a) A device shall be equipped with an effective **automatic** ~~**vapor eliminator or other effective**~~ means to prevent the passage of vapor through the meter.

(b) Vent lines from the vapor eliminator shall be made of appropriate non-collapsible material.

(Amended 20XX)

The proposed changes make the requirement less design-specific and more focused on ensuring that the means for eliminating air or vapor are effective, including that the vent lines not be susceptible to restriction. The proposed changes also clarify that the provision for vapor elimination must be automatic in nature in order to be considered effective.

NIST OWM in its analysis of the 2016 S&T Agenda Item referenced above suggested that a similar change be proposed, where necessary, to corresponding requirements in other measuring codes and encouraged the Committee to consider including such an item on its agenda in the 2016-2017 NCWM cycle.

Note that the Mass Flow Meters Code states "means to prevent the measurement of vapor and air" while other codes state "means to prevent the passage of vapor and air through the meter," but such distinction is probably justified. Consequently, no modifications are proposed to align this language with other codes.

Item New-13
Summary of comments considered by the regional committee (in writing or during the open hearings):
The committee groups Items 13, 14, 15, 16 and 17 together and heard comments simultaneously. Industry supports but would like to see an editorial comment. In New-13 S.2.1. would like to see the word "system" following "a liquid measuring device". The committee moves these items to voting with recommended editorial change.
Item as proposed by the regional committee: ***(If different than agenda item)***
Committee recommendation to the region: ☒ Voting Item on the NCWM Agenda ☐ Information Item on the NCWM Agenda ☐ Withdraw the Item from the NCWM Agenda (*In the case of new items, do not forward to NCWM)* ☐ Developing Item on the NCWM Agenda *(To be developed by source)*
Reasons for the committee recommendation:

NEWMA S & T committee recommends forwarding this item as Voting with one editorial change in New 13.
COMPLETE SECTION BELOW FOLLOWING VOTING SESSION
Final updated or revised proposal from the region: ***(If different than regional committee recommendation)***
Regional recommendation to NCWM for item status: ☒ Voting Item on the NCWM Agenda ☐ Information Item on the NCWM Agenda ☐ Withdraw the Item from the NCWM Agenda (*In the case of new items, do not forward to NCWM)* ☐ Developing Item on the NCWM Agenda *(To be developed by source)* ☐ Unable to consider at this time *(Provide explanation in the "Additional Comments" section below)*
Regional Report to NCWM: Please provide your report in this section exactly how you want it to appear in the NCWM reports to represent your region's considerations, support or opposition, and recommendations. **This will replace any previous reports from your region on this item.**
NEWMA S & T committee recommends forwarding this item as Voting with one editorial change in New 13.

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

New-18 UR.3.4. Printed Ticket

This item was not submitted to your region.

3300-1 D Recognized the Use of Digital Density Meters

Source:
Missouri (2016)

Purpose:
Allow the use of digital density meters for inspections of meter for viscous fluids such as motor oils, diesel exhaust fluid (DEF) and antifreeze.

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

Develop provisions in various LMD Codes of Handbook 44 that would recognize the use of digital density meters in lieu of volumetric provers, or the use of flasks and thermometers in the case of gravimetric testing) when testing meters used to dispense certain viscous fluids such as motor oil, DEF, antifreeze, syrups, etc.

"Digital density meters may be a solution for testing motor oil, DEF and anti-freeze meters."

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

Ronald Hayes
Missouri Department of Agriculture

573-751-4316
Ron.hayes@mda.mo.gov

Background/Discussion:
Current test procedures are slow and awkward due to the need of using borosilicate glassware for package checking. Digital density meters are fast, use small samples size (2 ml) and have built in thermometers.

When conducting volumetric testing of meters used for dispensing viscous fluids such as motor oil, DEF, antifreeze, syrups, etc., air becomes entrapped in the fluid and clings to the sides of the prover which adversely affect the results of the test. In order to conduct gravimetric tests, it is necessary to determine the density of the product. Digital density meters are fast and accurate in comparison with recognized gravimetric testing procedures using flasks and thermometers. There is no need to "wet down" volumetric flasks before each measurement. Most non-food products may be recovered without contamination. Only a small sample size (2 ml) of the product is needed for testing. Using digital density meters equipped with built-in API density tables will not require the cooling samples to 60 F. There is no need for a partial immersion thermometer or volumetric flasks.

Well established ASTM and other international standard test methods are available with precision statements.

2016 NCWM Interim Meeting:
Mrs. Tina Butcher (OWM) and Mr. Ross Anderson (NY-Retired) both stated they supported the concept, but questioned whether the use of density meters needed to be addressed in HB 44. They suggested a more appropriate place might be in an EPO or other similar document. Mr. Michael Keilty (Endress + Hauser Flowtec) recommended keeping this in a "Developmental" status because the direction of the item was a little unclear. Mr. Dmitri Karimov (Liquid Controls) recommended this item be withdrawn. Based on the comments received, the Committee agreed to assign the item a "Developing" status.

Regional Association Comments:
CWMA noted that this item was included on the Laws and Regulations Committee agenda and recommended that it be withdrawn from the Specifications and Tolerances Committee agenda.

NEWMA recommended that this item remain as a Developing item.

SWMA heard comments in support of this item and forwarded it to NCWM, recommending it as a Voting item.

Item New-3300-1
Summary of comments considered by the regional committee (in writing or during the open hearings):
Sister item to L & R. L & R sent back to developing, S & T follows suit. No comments were heard.
Item as proposed by the regional committee: ***(If different than agenda item)***
Committee recommendation to the region: ☐ Voting Item on the NCWM Agenda ☐ Information Item on the NCWM Agenda ☐ Withdraw the Item from the NCWM Agenda (*In the case of new items, do not forward to NCWM)* ☒ Developing Item on the NCWM Agenda *(To be developed by source)*
Reasons for the committee recommendation:
The NEWMA S & T Committee recommends this item to remain developing.
COMPLETE SECTION BELOW FOLLOWING VOTING SESSION
Final updated or revised proposal from the region: ***(If different than regional committee recommendation)***

Regional recommendation to NCWM for item status: ☐ Voting Item on the NCWM Agenda ☐ Information Item on the NCWM Agenda ☐ Withdraw the Item from the NCWM Agenda (*In the case of new items, do not forward to NCWM)* ☒ Developing Item on the NCWM Agenda *(To be developed by source)* ☐ Unable to consider at this time *(Provide explanation in the "Additional Comments" section below)*
Regional Report to NCWM: Please provide your report in this section exactly how you want it to appear in the NCWM reports to represent your region's considerations, support or opposition, and recommendations. **This will replace any previous reports from your region on this item.**
The NEWMA S & T Committee recommends this item to remain developing.

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

3301 VEHICLE-TANK METERS

New-14 S.2.1. Vapor Elimination (See related items New-13, New-15, New-16 and New-17)

Source:
Liquid Controls and NIST OWM (2017)

Purpose:
Align other measuring device codes with the changes adopted in S&T LPG & NH_3 Code Item 332-3 (S.2.1. Vapor Elimination).

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

S.2.1. Vapor Elimination.

(a) A metering system shall be equipped with an effective vapor or air eliminator or other automatic means to prevent the passage of vapor and air through the meter.

(b) Vent lines from the air or vapor eliminator shall be made of ~~metal tubing or some other suitable rigid material~~ **appropriate non-collapsible material**.

(Amended 1993)
(Amended 2017)

Background/Discussion:
The proposed changes would ensure consistency across the various measuring device codes in NIST Handbook 44. This would help ensure more uniform interpretation of the requirements and facilitate application by officials and industry.

The proposed changes will align other codes with the following changes that were made to the LPG code at the 2016 NCWM Annual Meeting.

S.2.1. Vapor Elimination. –

(a) A device shall be equipped with an effective **automatic** ~~**vapor eliminator or other effective**~~ means to prevent the passage of vapor through the meter.

(b) Vent lines from the vapor eliminator shall be made of appropriate non-collapsible material.

(Amended 20XX)

The proposed changes make the requirement less design-specific and more focused on ensuring that the means for eliminating air or vapor are effective, including that the vent lines not be susceptible to restriction. The proposed changes also clarify that the provision for vapor elimination must be automatic in nature in order to be considered effective.

NIST OWM in its analysis of the 2016 S&T Agenda Item referenced above suggested that a similar change be proposed, where necessary, to corresponding requirements in other measuring codes and encouraged the Committee to consider including such an item on its agenda in the 2016-2017 NCWM cycle.

Note that the Mass Flow Meters Code states "means to prevent the measurement of vapor and air" while other codes state "means to prevent the passage of vapor and air through the meter," but such distinction is probably justified. Consequently, no modifications are proposed to align this language with other codes.

Item New-14
Summary of comments considered by the regional committee (in writing or during the open hearings):
The committee groups Items 13, 14, 15, 16 and 17 together and heard comments simultaneously. Industry supports but would like to see an editorial comment. In New-13 S.2.1. would like to see the word "system" following "a liquid measuring device". The committee moves these items to voting with recommended editorial change.
Item as proposed by the regional committee: ***(If different than agenda item)***
Committee recommendation to the region: ☒ Voting Item on the NCWM Agenda ☐ Information Item on the NCWM Agenda ☐ Withdraw the Item from the NCWM Agenda (*In the case of new items, do not forward to NCWM)* ☐ Developing Item on the NCWM Agenda *(To be developed by source)*
Reasons for the committee recommendation:
The NEWMA S & T Committee recommends this item to given a Voting status.
COMPLETE SECTION BELOW FOLLOWING VOTING SESSION
Final updated or revised proposal from the region: ***(If different than regional committee recommendation)***
Regional recommendation to NCWM for item status: ☒ Voting Item on the NCWM Agenda ☐ Information Item on the NCWM Agenda ☐ Withdraw the Item from the NCWM Agenda (*In the case of new items, do not forward to NCWM)* ☐ Developing Item on the NCWM Agenda *(To be developed by source)* ☐ Unable to consider at this time *(Provide explanation in the "Additional Comments" section below)*
Regional Report to NCWM: Please provide your report in this section exactly how you want it to appear in the NCWM reports to represent your region's considerations, support or opposition, and recommendations. **This will replace any previous reports from your region on this item.**
The NEWMA S & T Committee recommends this item to given a Voting status with one editorial change.

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

3301-1 D S.3.7. Manifold Hose Flush System

Source:
New York (2016)

Purpose:
Recognize the use of hose flush systems in the HB 44 VTM code**.**

Item under Consideration:
Amend NIST Handbook 44 Vehicle Tank Meter Code as follows:

S.3.7. Manifold Hose Flush System. – A hose flush system to clear the hose of product may be installed in the manifold when multiple products are dispensed through a single meter and hose under the following conditions:

(a) the inlet valves for the system are conspicuously located above the bottom framework of the truck; and

(b) the inlet valves for the system are not connected to any hose or piping (dust covers are permitted) when not in use; and

(c) the discharge hose remains of the wet hose type; and

(d) the direction of flow for which the system may be set at any time is definitely and conspicuously indicated; and

(e) a recorded representation of each flush is maintained for inspection.

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

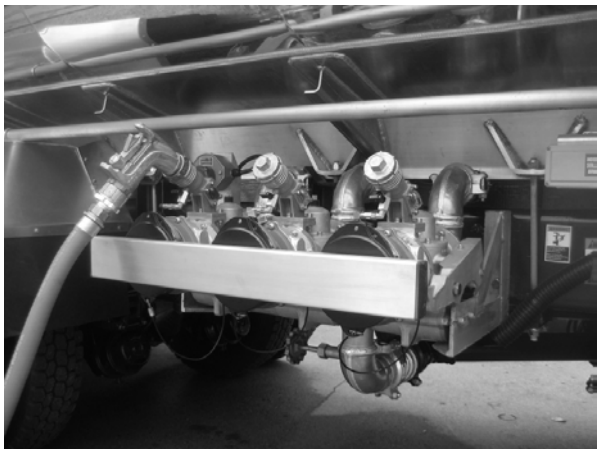
Mike Sikula
New York Department of Agriculture
518-457-3146
Mike.sikula@agriculture.ny.gov

Background/Discussion:
Hose flush systems allow drivers to flush product where a truck is set-up to deliver multiple products through a single meter and hose. The system is particularly popular because it allows drivers to flush product without having to climb up on top of the truck which is a common practice in the industry but can also be dangerous. These systems are considered a significant safety advancement, however, without safeguards in place could also be used to facilitate fraud.

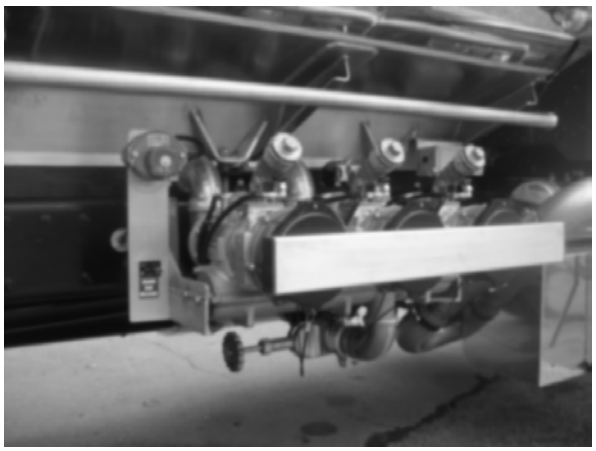
These systems are being used country wide and there is no uniformity in what is and what is not acceptable by W&M. Some states have developed their own policies for acceptance but this has led to problems when trucks have been moved from one state to another. Some states are considering prohibiting these systems citing facilitation of

fraud, however, they are also concerned that such prohibition may lead to drivers being unnecessarily injured or even killed. We want to do our job but we also want drivers to be able to do their jobs in the safest way possible.

These systems make returning product after W&M testing very easy. These systems are also very good for preventing contamination of product.



3 Compartment Manifold with Nozzle



3 Compartment Manifold

2016 NCWM Interim Meeting:
The Committee heard comments on this item from Mr. Mike Sikula (New York), Mr. Hal Prince (Florida), Mr. Steve Giguere (Maine), Mr. John McGuire (New Jersey), Mr. Charlie Carroll (Massachusetts), Mrs. Tina Butcher (OWM), Mr. Dmitri Karimov (Liquid Controls), and from Mr. Dick Suiter (Richard Suiter Consulting). Mr. Sikula indicated that some newer trucks were designed with manifold hose flush systems that needed controls to prevent fraud, and also pointed out that this was a nationwide issue not just a New York issue.

Mrs. Butcher mentioned a need to provide additional safeguards; mark direction of flow on inlet and outlet valves; and add user requirements on when and how these systems should be used. Mr. Karimov advocated the addition of a second meter. Mr. Carroll said manifold flush systems should not be allowed.

There was general consensus in the comments heard that the hose flush back systems have arisen from a desire to minimize safety concerns with the delivery drivers having to climb up on top of trucks to flush hoses; however, these systems could enable fraud as fuel could be diverted after the meter and documentation of the flushing is typically not maintained. The Committee believes this item has merit and needs further development and is interested in hearing from other states and manufacturers on this issue.

Regional Association Comments:
CWMA believed this item has merit and the comments received were in support of it but recommended that it remain a Developing item.

NEWMA received a request by the submitter to make this an Information item but NEWMA believed there is still work to be done by the submitter therefore NEWMA recommended the item remain Developing.

Item: 3301-1
Summary of comments considered by the regional committee (in writing or during the open hearings):
Presentation by Mike Sikula of New York (author). Requested another year to develop this item and receive more input. Comments supported this. Committee agreed to keep developing for another year.
Item as proposed by the regional committee: ***(If different than agenda item)***

Committee recommendation to the region:

- ☐ Voting Item on the NCWM Agenda
- ☐ Information Item on the NCWM Agenda
- ☐ Withdraw the Item from the NCWM Agenda (*In the case of new items, do not forward to NCWM)*
- ☒ Developing Item on the NCWM Agenda *(To be developed by source)*

Reasons for the committee recommendation:

The submitter requested 1 more year to further develop this item; NEWMA S & T Committee recommends this item to remain developing.

COMPLETE SECTION BELOW FOLLOWING VOTING SESSION

Final updated or revised proposal from the region: ***(If different than regional committee recommendation)***

Regional recommendation to NCWM for item status:

- ☐ Voting Item on the NCWM Agenda
- ☐ Information Item on the NCWM Agenda
- ☐ Withdraw the Item from the NCWM Agenda (*In the case of new items, do not forward to NCWM)*
- ☒ Developing Item on the NCWM Agenda *(To be developed by source)*
- ☐ Unable to consider at this time *(Provide explanation in the "Additional Comments" section below)*

Regional Report to NCWM:

Please provide your report in this section exactly how you want it to appear in the NCWM reports to represent your region's considerations, support or opposition, and recommendations. **This will replace any previous reports from your region on this item.**

The submitter requested 1 more year to further develop this item; NEWMA S & T Committee recommends this item to remain developing.

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

New-3 S.5.7. Meter Size

This item was not submitted to your region.

New-4 N.4.X. Automatic Stop Mechanism, T.X. Automatic Stop Mechanism and UR.2.6. Automatic Stop Mechanism

This item was not submitted to your region.

3302 LPG AND ANHYDROUS AMMONIA LIQUID-MEASURING DEVICES

3302-1 D N.3. Test Drafts.

Source:
Endress + Hauser Flowtec AG USA (2015)

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

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

N.3. Test Drafts. –

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

N.3.2. Transfer Standard Test. – When comparing a meter with a calibrated transfer standard, the test draft shall be equal to at least the amount delivered by the device in 2 minutes at its maximum discharge rate.

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)

N.3.2. Transfer Standard 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.

NOTE: The development of this item was assigned to Michael Keilty of Endress + Hauser Flowtec AG USA. In the fall of 2016, Mr. Keilty updated the Item under Consideration. See the Background/Discussion for this item in Appendix A to view the original proposed amendments.

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

Michael Keilty
Endress + Hauser Flowtec AG USA
970-586-2122
michael.keilty@us.endress.com

Background / Discussion:
In the fall of 2016, Mr. Keilty provided an update to the Item under Consideration. That update appears in the agenda. The previous proposed Item under Consideration was as follows:

N.3. Test Drafts. –

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

N.3.2. Transfer Standard Test. – When comparing a meter with a calibrated transfer standard, the test draft shall be equal to at least the amount delivered by the device in 2 minutes at its maximum discharge rate.

The use of transfer standards is recognized in code sections 3.34 Cryogenic Liquid-Measuring Devices Code and 3.38 Carbon Dioxide Liquid-Measuring Devices Code and 3.39 Hydrogen Gas-Measuring Devices – Tentative Code. Field evaluation of LPG meters and CNG dispensers and LNG dispensers is very difficult using volumetric and gravimetric field standards and methods. The tolerances for these applications are such that using transfer meter standards are more efficient and safer. With CNG and LNG and LPG applications, the transfer standard meters are placed in-line with the delivery system as it is used to fill tanks and vehicles. The use of transfer standards eliminates return to storage issues. The use of transfer standard meters is easier and faster compared to the use of traditional field standards. The cost of using transfer standards and transporting them is much less than the cost of traditional field provers and standards. Recognition in Handbook 44 will enable States to allow transfer standard meters to place systems into service and for field enforcement.

The amended language is made to clarify the minimum test quantity for using transfer standard meters accommodating both large quantity and low quantity delivery systems.

Volumetric field provers and gravimetric field proving are susceptible to environmental influences. The States commonly use meters as transfer standards to test rack meters.

In some applications, transfer standard meters are not more accurate than the meters used in the dispenser. For that reason, longer test drafts and possibly more tests need to be run.

The State of California is purported to have conducted a short study of master meters in the past. The conclusion did not lead to wide adoption of the practice. However, the State of California uses a mass flow meter as a master meter for carbon dioxide flowmeter enforcement.

Section 3.37 Mass Flow Meters user requirement U.R.3.8. Return of Product to Storage, Retail Compressed Natural Gas Dispensers requires that the natural gas which is delivered into the test container must be returned to storage. This is difficult and most often not complied with when the test vessel contents are released to atmosphere.

The submitter recommends that NIST update EPO 28 for CNG dispensers and EPO 26 for LPG Liquid Measuring Systems to include transfer standard meter tests. NIST Publication R 105-4 should also be revised to specifically address the transfer standard meter and the requirements for use.

The S&T Committee might also consider amending Sections 3.30 Liquid-Measuring Devices Code and 3.31 Vehicle-Tank Meters Code to allow transfer standard meters.

2015 NCWM Interim Meeting
At the 2015 NCWM Interim Meeting, the Committee agreed to group together Agenda Items 330-2 and 337-3 since these items are related and announced that comments on both items would be taken together during the open hearings.

Mr. Michael Keilty (Endress + Hauser Flowtec AG USA), submitter of the item, presented a short list of benefits to using a master meter as the standard in testing meters used in applications to measure CNG, LNG, and LPG in comparison to using volumetric or gravimetric standards. He stated that master meters are safer, more efficient, and provide a faster means of verifying meter accuracy. An additional benefit is that using a master meter eliminates the

need to return product to storage because product can be dispensed through the master meter as part of the refueling procedure. He encouraged the recognition of master meters in HB 44 for use as a transfer standard in testing.

Mr. Henry Oppermann (Weights and Measures Consulting, LLC) provided written comments to the Committee concerning this item, which he summarized in comments presented during the open hearings. Mr. Oppermann stated there are significant differences between a transfer standard and a field standard. It is necessary to consider the accuracy of these standards. Field standards must satisfy the Fundamental Considerations of HB 44 Section 3.2 Tolerances for Standards, whereas transfer standards are recognized for use in some HB device codes, but do not satisfy the one-third requirement specified in Section 3.2. (*Technical Advisors note: Section 3.2. of the Fundamental Considerations requires the combined error and uncertainty of any standard used in testing to be less than one-third the applicable tolerance applied to the device under test unless corrections are made).* Mr. Oppermann recommended keeping clear this distinction, noting that the current proposal is incomplete if it doesn't include an additional tolerance when you test a device using a master meter (i.e., a transfer standard).

In response to Mr. Oppermann's comment regarding the need for an additional tolerance, Mr. Keilty stated that he isn't requesting a different tolerance be applied to the device under test. Current technology already enables the standard to comply.

Mrs. Tina Butcher (OWM) acknowledged that development of alternative methods of testing is beneficial because there are many applications where the nature of the product makes current methods impractical. She stressed, however, that adding a paragraph to HB 44, alone, doesn't provide recognition of a test method. There is a laundry list of pieces that need to be in place before a standard should be considered suitable for use in testing by providing traceability measurements including things such as:

- the accuracy of the standard (or the degree of accuracy that one can expect to achieve from using the standard) in relation to the tolerances that apply to the device being tested;
- HB 44 Fundamental Considerations – Tolerances for Standards;
- proper training and procedures for using the standard;
- training of laboratory personnel and the capability of the labs to verify the adequacy of the standard for use in testing another device; and
- collection and analysis of data obtained from having used the standard repeatedly over time.

Mrs. Butcher also noted that a USNWG has been assembled to review the different (alternative) test methods and this might be an appropriate group to review such equipment as resources allow. She also noted that the decision of whether or not to accept a particular method ultimately rests with the regulatory authority.

Mr. Dmitri Karimov (Liquid Control, LLC) noted that the Mass Flow Meters Code covers all applications where a mass flow meter is used. There are five measuring device codes within HB 44. Simply adding language to recognize the use of a particular piece of test equipment doesn't necessarily ensure its use is acceptable in testing. The decision of whether or not to use the test equipment resides with the regulatory authority where the meters are located.

The Committee agreed this item has merit and recommends the submitter of these items work with OWM by providing data for the WG to consider in determining the suitability of the master meter transfer standard as a standard in testing another device.

2015 NCWM Annual Meeting

At the 2015 NCWM Annual Meeting, the Committee agreed to group together Agenda Items 332-2 and 337-3 and took comments on the two items simultaneously. The Committee heard comments both in support and opposition of the proposals.

Mr. Michael Keilty (Endress + Hauser Flowtec AG USA), submitter of the item noted there is already an allowance for a field transfer standard in the Cryogenic Liquid-Measuring Devices Code, Carbon Dioxide Liquid-Measuring Devices Code, and in the Hydrogen Gas-Measuring Code. He asked there also be an allowance for a field transfer standard in the Anhydrous Ammonia Liquid-Measuring Devices Code and Mass Flow Meters Code, noting there's already information in those codes to support using a transfer standard. He also requested the Committee consider moving these two items forward as Voting items.

Mr. Henry Oppermann (Weights and Measures Consulting, LLC) speaking on behalf of Seraphin Test Measure, Co commented that there's a difference between a transfer standard and a field standard. Field standards must comply with the NIST Handbook 105 series. A transfer standard, in order to be used for testing another device, must be accurate and repeatable over the full range of how it will be used, to include temperature, flow rates, etc. Accuracy and repeatability must not change between times when it is used. He stated that Mr. Keilty is looking at a standard to meet the Fundamental Considerations of HB 44 and it is his view (that is, Mr. Oppermann's view) that that's a field standard and not a transfer standard.

Mrs. Tina Butcher (OWM) commented that OWM believes that the development of alternative methods of testing commercial metering systems is an important issue. There are many applications in which using currently recognized test methods may not be feasible because of product characteristics, safety, cost, access to equipment, and other factors. OWM is not opposed to adding a paragraph to the two device codes as proposed, but by doing so, it wouldn't ensure approval of any proposed test method. The decision on whether or not to accept a particular test method for use in testing commercial weighing and measuring equipment ultimately rests with the regulatory authority.

There are a number of things that must be considered when selecting field standards and determining whether or not they are suitable and can be used to provide traceable measurements. These factors are sometimes referred to as the "essential elements of traceability." As noted by OWM during the 2015 NCWM Interim Meeting the pieces that need to be in place before a standard should be considered suitable for use in testing by providing traceability measurements include things such as:

- the accuracy of the standard (or the degree of accuracy that one can expect to achieve from using the standard) in relation to the tolerances that apply to the device being tested;
- HB 44 Fundamental Considerations – Tolerances for Standards;
- proper training and procedures for using the standard;
- training of laboratory personnel and the capability of the labs to verify the adequacy of the standard for use in testing another device; and
- collection and analysis of data obtained from having used the standard repeatedly over time.

With regard to the relative accuracy of a particular test standard, the Fundamental Considerations in NIST HB 44 Section 3.2. Tolerances for Standards specify that when a standard is used without correction its combined error and uncertainty must be less than 1/3 of the applicable tolerance. Some of the other factors include demonstrated reliability of the device over time; device repeatability; how well it duplicates actual use; existence of documentary standards for the test equipment; availability of equipment and facilities within a state laboratory to test the equipment; and whether training has been provided for the laboratory staff, field officials, and users of the equipment. These and other factors have also been raised by others during the Committee's open hearings.

NIST OWM established a U.S. National Work Group to examine alternative test methods. A subgroup within that USNWG is presently working to establish uncertainties for selected different test methods. OWM has circulated a draft document with guidelines for collecting test data within this subgroup; once finalized, this document might be useful in collecting such data on the use of other types of standards. Currently, there are no representatives on the subcommittee to review factors that affect the uncertainties of measurements using master meters. However, several members of the larger work group have expressed interest in developing standards and test procedures for master meters in some applications. Should industry want to pursue recognition of master meters, test data may be needed to determine whether or not this is a viable method and the OWM guidelines might be used for this purpose. Collecting data to assess the test uncertainties associated with using master meters would provide useful information on the potential use of transfer standard meters (master meters) for field testing.

With regard to the specific language in the proposed new paragraph N.3.2. Transfer Standard Test, the Developer may wish to consider eliminating the phrase "test draft" and replacing it with the phrase "delivered quantity" as shown in the alternative version below. This change would be consistent with changes made in 1996 to LMD Code requirements for test drafts to better allow for the use of alternative test methods such as small volume provers.

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

Ms. Kristin Macey (CA) commented that if the proposal were adopted, it would allow use of a transfer standard and California would not be able to fully support it. She noted that the State of California had completed some comparison testing using the following different test methods: "pressure volume temperature," "gravimetric," and "master meter." Of the three methods compared, the master meter performed worst.

Several regulatory officials and one industry representative commented in support of the continued development of the two items. That industry representative also noted that the HB 44 definition of "transfer standard" needs to be expanded.

Mr. Keilty, in response to Mrs. Butcher's and Mr. Oppermann's comments, stated that he agreed completely. Adding the paragraph to these two codes is a step towards allowing the use of transfer standards and it's understood that there's a number of things that would need to be in place in order that they be considered suitable for use in testing. He further noted that a change to the tolerances in these two codes is not being proposed.

2016 NCWM Interim Meeting:
At the 2016 NCWM Interim Meeting, the Committee grouped Items 332-5 and 337-3 together and comments were taken simultaneously on these two items.

Mr. Michael Keilty (Endress + Hauser Flowtec), the submitter, stated that he supported this item as a voting item. Mr. Alan Walker (FL) spoke in support of the item and recommended it move forward as a voting item. Mr. Dmitri Karimov (Liquid Controls) recommended limiting the application of the proposal to retail CNG testing, which was echoed by Mr. Randy Moses (Wayne) stating he supported the concept for CNG testing. Mr. Mike Sikula (NY) supported the continued investigation of this item. Mrs. Tina Butcher (OWM) stated that there is a USNWG subgroup presently working to establish uncertainties for select test methods. Currently, there are no representatives on the subcommittee to review factors that affect the uncertainties of measurements using master meters. OWM questions whether or not consideration needs to be given to providing a larger tolerance when conducting tests using a transfer standard as is done in the carbon dioxide and hydrogen codes. Testing would need to be conducted to demonstrate the magnitude of the additional tolerance. Mrs. Butcher further stated that if the current proposal passed it doesn't mean that all jurisdictions would support it.

The Committee also received written comments from Mr. Henry Oppermann (Weights and Measures Consulting, LLC) on behalf of Seraphin Test Measure Company suggesting that additional test data is needed to be able to properly evaluate whether or not a calibrated transfer standard, e.g. a master meter, can be considered a suitable standard in testing devices that dispense such products.

During the Committee's work session, members of the Committee acknowledged that both written and some verbal comments received suggested the need for additional test data. It was also acknowledged that there was a lot of support for the proposal. Those supporting the proposal had indicated that using a transfer standard is much easier and faster than testing gravimetrically and eliminates the need to discharge product from a prover into the atmosphere, which is viewed by many as a safety concern. In discussing the item, it was noted that adding a requirement recognizing the use of transfer standards to the two codes wouldn't dictate the method of testing that a jurisdiction would have to use. The proposal only recognizes the use of transfer standards in testing and the decision on whether or not to use a particular method of testing would remain with each jurisdiction. Given these considerations, the Committee agreed to present both items for vote at the Annual Meeting.

2016 NCWM Annual Meeting:
At the 2016 NCWM Annual Meeting, the Committee grouped Items 332-5 and 337-3 together and comments were taken simultaneously on these two items. The Committee received numerous comments from industry and regulators alike, predominantly in support of the proposals. The following are some of the more significant comments that the Committee heard in support of the proposals:

- Using a transfer standard (e.g., a calibrated master meter) provides a much safer means of testing than testing gravimetrically because the product discharged during testing goes into a receiving tank and does not get discharged into the atmosphere;
- Using a transfer standard to test provides a faster and more efficient means of testing.
- Adding language to HB 44, which recognizes the use of transfer standards in testing, provides the legal basis for using them;
- We have been using transfer standards very successfully in our state and have had no issues.
- HB 44 Fundamental Considerations does not address the test method. Only the standard has to be accurate to within one-third of the tolerance to be applied to the device being tested. *(Technical Advisor's note: This comment is in reference to the information contained in HB 44 Appendix A Fundamental Considerations paragraph 3.2. Tolerances for Standards)*

Mr. Marc Buttler (Emerson Process Management – Micro Motion) commented that he supports the adoption of both agenda items with one slight modification; replace the words "maximum discharge rate" with "maximum test rate" in proposed paragraph N.3.2. Mr. Michael Keilty (Endress + Hauser Flowtec AG USA) commented that he fully supports the change suggested by Mr. Buttler.

There were also some comments received suggesting the need for further development of the proposals. Mrs. Tina Butcher (OWM) stated that OWM considers the development of alternative methods of testing commercial measuring systems an important issue because there are many applications in which using currently recognized test methods may not be feasible because of product characteristics, safety, cost, access to equipment, and other factors. Mrs. Butcher reiterated many of the comments offered by OWM in previous NCWM Meetings as follows:

- Modifying HB 44 as proposed does not ensure approval of any proposed test method. The decision on whether or not to accept a particular test method for use in testing commercial weighing and measuring equipment ultimately rests with the regulatory authority.
  There is a need for those selecting an appropriate field standard, i.e., one that is suitable and can provide traceable measurements, to consider the various "essential elements of traceability" such as:
  - The standard's demonstrated reliability over time and its repeatability;
  - How well the standard duplicates actual use;
  - The existence of documentary standards;
  - The availability of equipment and facilities within a state laboratory to test the standard; and whether training has been provided for the laboratory staff, field officials, and users of the equipment.
- The importance for field standards to meet the accuracy requirements specified in the Fundamental Considerations of NIST HB 44 Section 3.2. Tolerances for Standards. Those requirements specify that when a standard is used without correction, its combined error and uncertainty must be less than 1/3 of the applicable tolerance.
- Whether or not consideration needs to be given to providing a larger tolerance when conducting tests using a transfer standard as is done in the carbon dioxide and hydrogen codes. If so, testing would need to be conducted to demonstrate the magnitude of the additional tolerance.
- Because there is a potential for more than one type of alternative test method, the proposed language may unintentionally limit those methods from consideration. For example, the proposed language may not allow the use of a small volume prover. OWM believes more analysis is needed prior to recommending specific language for adoption.

Mrs. Butcher noted that Weights and Measures needs a system that results in:

- manufacturers knowing the requirements for the design of the standard;
- systematic and appropriate collection of measurement data on proposed new standards; and
- states (regulatory authority) having access to the measurement data to determine whether or not a standard meets the guidelines in NIST HB 44 Fundamental Considerations and side-by-side testing to compare results with existing test methods.

Mrs. Butcher provided an update on the ongoing work of the U.S. National Working Group on Alternative Test Methods (ATMs) and reported that the NTEP Measuring Sector is currently developing guidelines for use by type-evaluation laboratories when conducting evaluations using transfer standards such as master meters, small volume provers, etc. Information from this group may be useful in further developing this item.

Mrs. Butcher also offered the following new OWM comments and recommendations regarding, in particular, the proposal to add paragraph N.3.1. to NIST HB 44 Section 3.37. Mass Flow Meters Code:

- Existing paragraph N.3. Test Drafts addresses the minimum test in terms of flow rate. That is, one test draft at the maximum flow rate of the installation and one test draft at the minimum flow rate.
    - It is not clear from the proposal if the intent is to strike the existing language in paragraph N.3. The proposal does not show the existing language in the paragraph (except for its title); yet, the language is not shown as being struck.
- Proposed new paragraph N.3.1. addresses the minimum test in terms of delivery amount. That is "at least the amount delivered by the device in one minute at its normal discharge rate."
    - OWM notes that all parts of paragraph N.3.1. Minimum Test shown in Item Under Consideration are new and not just the underlined portion. The entire paragraph should be bold and underlined in the agenda.
- Proposed new paragraph N.3.1. is not consistent with the minimum test of a CNG RMFD being performed today in accordance with the NIST EPO. A test conducted at the MMQ typically takes far less than a minute to complete. Additionally, the test drafts performed at one-third, two-thirds, and three-thirds test tank capacity often are completed in less than a minute's time.
- OWM believes more work is needed to further develop the minimum test requirements in the MFM Code.

In consideration of these comments, OWM recommended the two items be downgraded to Informational.

Mr. Henry Oppermann (Weights and Measures Consulting, LLC) speaking on behalf of Seraphin Test Measure, Co., stated that he agreed with OWM's comments and supported them. He disputed the claim made by an earlier speaker that the one-third error specified in HB 44 Fundamental Considerations applies only to the test standard. Mr. Oppermann indicated that the one-third tolerance applies not only to the test standard but also the uncertainties created by using the standard. He stressed the need for regulators to be able to prove that their test results are valid and questioned how regulators would know which standards are acceptable if they didn't have the proof to support their accuracy. He further noted that transfer standards, in some cases, are no more accurate than the meter being tested and that the proposals lack a specification associated with the performance of the standard. He recommended the items be downgraded to Informational or Developmental.

During the Committee's work session, members of the Committee agreed that the comments received during the Open Hearings were mostly in support of the two proposals. Mr. Harshman (NIST Technical Advisor) requested that members of the Committee, in consideration of the comments OWM had made during the Open Hearings, review proposed new paragraph N.3.1. in Agenda Item 337-3. Mr. Harshman explained that despite only the title being bold and underlined, the entire paragraph is new. The paragraph defines the minimum test of a mass flow meter and requires each test draft be comprised of at least the amount of product delivered by the device in one minute at its normal discharge rate. Mr. Harshman indicated that this proposed requirement cannot be met by someone wanting to apply the current test procedures in the NIST EPO for retail motor fuel devices used to dispense CNG. The procedures in the EPO require a test at one-third, two-thirds, and three-thirds test tank capacity, as well as a test at the minimum measured quantity (MMQ), providing the MMQ is less than one-third test tank capacity. Mr. Harshman noted that it was his experience, in working with some of the states conducting these tests, that each of these tests typically takes less than a minute to complete and in some cases far less than a minute. Some Committee members, familiar with applying the procedures in the NIST EPO, agreed that the testing typically takes less than a minute to complete. It was also noted that the NIST EPO had been developed years ago by a work group comprised of subject matter experts.

The Committee concluded that proposed paragraph N.3.1. may conflict with existing paragraph N.3. Test Drafts, which specifies 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. This then caused the Committee to question whether the submitter had fully considered the impact the two proposals would have on other existing requirements in the two Codes, which led to the Committee's majority decision to downgrade both items to Developing and return them to the submitter.

Regional Association Comments:
WWMA did not receive comments during open hearings**.** During discussion on this item, Committee members expressed their concern over the choice of requiring 2 minutes of flow. The WWMA S&T Committee sees possible merit in the proposal but believes that refinements and more test data are needed before further consideration can be given to this item. WWMA recommended that this item remain as a Developing Item.

CWMA believes believed this item has merit and the comments received were in support of the use of transfer standards once the proper procedures have been developed to insure accuracy, traceability, and suitability. CWMA recommended that this item be a Developing item.

NEWMA members could not support this item as Voting. There are too many uncertainties associated with the use of a master meter as a transfer standard for select test methods, e.g., calibration of specific viscosities, no clear definition, no traceability in the use of testing CNG, LNG and LPG. NEWMA recommended this item be downgraded to Information.

SWMA batched this item with Item 337-3 and heard them together. SWMA recommends that these items be Voting items.

Item: 3302-1
Summary of comments considered by the regional committee (in writing or during the open hearings):
The committee grouped this Item with 3307-1. Multiple comments heard recommending a withdrawal of this item; transfer meter standards are not calibrated devices. Multiple comments heard advising that this should be developed as it had merit. Vote was taken between the two but was tied. It was proposed that we give the item another year to develop as it is still fairly new. If no more data is added it will be withdrawn at the next NEWMA Interim.
Item as proposed by the regional committee: ***(If different than agenda item)***
Committee recommendation to the region: ☐ Voting Item on the NCWM Agenda ☐ Information Item on the NCWM Agenda ☐ Withdraw the Item from the NCWM Agenda (*In the case of new items, do not forward to NCWM)* ☒ Developing Item on the NCWM Agenda *(To be developed by source)*
Reasons for the committee recommendation:
The NEWMA S & T committee forwards this item as developing for one more year cycle (2017).
COMPLETE SECTION BELOW FOLLOWING VOTING SESSION
Final updated or revised proposal from the region: ***(If different than regional committee recommendation)***
Regional recommendation to NCWM for item status: ☐ Voting Item on the NCWM Agenda ☐ Information Item on the NCWM Agenda ☐ Withdraw the Item from the NCWM Agenda (*In the case of new items, do not forward to NCWM)* ☒ Developing Item on the NCWM Agenda *(To be developed by source)* ☐ Unable to consider at this time *(Provide explanation in the "Additional Comments" section below)*
Regional Report to NCWM: Please provide your report in this section exactly how you want it to appear in the NCWM reports to represent your region's considerations, support or opposition, and recommendations. **This will replace any previous reports from your region on this item.**
The NEWMA S & T committee forwards this item as developing for one more year cycle (2017).

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

New-20 N.4.1.2. Repeatability Tests and N.4.2.4. Repeatability Tests for Type Evaluation

Source:
Ross Andersen, Retired (2017)

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

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

> **N.4.1.2. Repeatability Tests. –** Tests for repeatability should include a minimum of three consecutive test drafts of approximately the same size and be conducted under controlled conditions where variations in factors such as temperature, pressure, and flow rate are reduced to the extent that they will not affect the results obtained. **Repeatability tests shall be based on the uncompensated volume, e.g. with the temperature compensator deactivated. Both field tests and type evaluation tests shall be run at flow rates consistent with normal tests as specified in N.4.1.**
> **(amended 20XX)**
>
> Add a new Paragraph N.4.2.4. as follows:
>
> **N.4.2.4. Repeatability Tests for Type Evaluation. – Tests for repeatability should include a minimum of three consecutive test drafts of approximately the same size and be conducted under controlled conditions where variations in factors such as temperature, pressure, and flow rate are reduced to the extent that they will not affect the results obtained. Repeatability tests shall be based on the uncompensated volume, e.g. with the temperature compensator deactivated. Type evaluation tests shall be run at flow rates consistent with special tests as specified in N.4.2., N.4.2.1., N.4.2.2,, or N.4.2.3. as appropriate.**
> **(Added 20XX)**

Background/Discussion:
The proposal is aimed to correct a number of areas of confusion. The inclusion of repeatability in the N.4.1. series indicates that repeatability is to be run at normal flow rates. There was some confusion if this was the actual intent? Running the tests only at Normal flow rates is consistently how the test was performed in the field. The amendment to N.4.1.2. clarifies this explicitly for field tests and type evaluation tests.

The new paragraph was added because NTEP has for a long time required repeatability on tests over the entire range of flow rates conducted under controlled conditions during type evaluation testing. This means anywhere between rated maximum and minimum flow rates. The code addition now formalizes and legitimizes what has been done for a long time.

Another question arose whether gross or net results could be used in repeatability tests? Obviously you can't compare net to gross but you can compare three consecutive gross or three consecutive net results. As the practice in HB44 is to test one variable at a time to the extent possible, the revision clarifies that repeatability is addressed to gross meter performance only. This can be through deactivating the ATC or just using gross values where both gross and net are available from the same test.

Item New-20
Summary of comments considered by the regional committee (in writing or during the open hearings):
Author not in attendance. Item was proposed to be withdrawn but others spoke that the item was worth keeping allowing the author time to develop and present this item. There were some concerns about the ATC deactivation portion of the proposal and repeatability should be there same for both tests. Vote went in favor of developing.
Item as proposed by the regional committee: ***(If different than agenda item)***
Committee recommendation to the region: ☐ Voting Item on the NCWM Agenda ☐ Information Item on the NCWM Agenda ☐ Withdraw the Item from the NCWM Agenda (*In the case of new items, do not forward to NCWM)* ☒ Developing Item on the NCWM Agenda *(To be developed by source)*
Reasons for the committee recommendation:
The NEWMA S & T Committee forwards this item as developing.
COMPLETE SECTION BELOW FOLLOWING VOTING SESSION
Final updated or revised proposal from the region: ***(If different than regional committee recommendation)***
Regional recommendation to NCWM for item status: ☐ Voting Item on the NCWM Agenda ☐ Information Item on the NCWM Agenda ☐ Withdraw the Item from the NCWM Agenda (*In the case of new items, do not forward to NCWM)* ☒ Developing Item on the NCWM Agenda *(To be developed by source)* ☐ Unable to consider at this time *(Provide explanation in the "Additional Comments" section below)*
Regional Report to NCWM: Please provide your report in this section exactly how you want it to appear in the NCWM reports to represent your region's considerations, support or opposition, and recommendations. **This will replace any previous reports from your region on this item.**
The NEWMA S & T Committee forwards this item as developing.

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

3302-2 N.4.2.3. For Wholesale Devices

Source:
NIST Office of Weights and Measures (2016)

Purpose:

1) To specify the purpose of special tests conducted on Wholesale LPG and Anhydrous Ammonia Liquid-Measuring Devices;
2) To specify that the special tests are to be conducted at or slightly above the designated flow rates in the referenced paragraph; and
3) To specify that the special tests are not to be conducted below the device's marked minimum discharge rate.

Item under Consideration:

Amend NIST Handbook 44, Liquefied Petroleum Gas and Anhydrous Liquid-Measuring Devices Code as follows:

N.4.2.3. For Wholesale Devices. – ~~**A wholesale device shall be so tested at a minimum discharge rate of:**~~ "**Special" tests shall be made to develop the operating characteristics of a measuring system and any special elements and accessories attached to or associated with the device. "Special" tests shall include a test at or slightly above the slower of the following rates:**

(a) 40 L (10 gal) per minute for a device with a rated maximum discharge less than 180 L (50 gal) per minute~~.~~**;**

(b) 20 % of the marked maximum discharge rate for a device with a rated maximum discharge of 180 L (50 gal) per minute or more~~.~~**;** or

(c) the minimum discharge rate marked on the device~~**, whichever is least**~~.

In no case shall the test be performed at a flow rate less than the minimum discharge rate marked on the device.

(Amended 1987 **and 20XX**)

Background/Discussion:
At the 2016 Annual Meeting, the Committee changed the status of this item from Voting to Informational in response to recommendations by the NIST Office of Weights and Measures and the Meter Manufacturers Association.

In 2014, the Liquid-Measuring Devices (LMD) Code of NIST Handbook 44 was modified to clarify testing requirements for special tests of wholesale LMDs and to help to ensure that those tests were not conducted at flow rates less than the minimum flow rates marked by the manufacturers of the metering systems. The proposed changes outlined above would align the special test requirements for LPG and Anhydrous Ammonia Liquid-Measuring Devices with those adopted in 2014 in the LMD Code and provide consistency in testing procedures across similar measuring codes.

During training seminars for weights and measures officials and service personnel, NIST OWM and other trainers instruct students to conduct special tests slightly above the marked minimum flow rate. While an official or service agent is not precluded from setting the flow rate exactly at the marked minimum flow rate, special care must be taken to ensure that the flow rate does not drop below the marked minimum during the course of the test. This can sometimes be difficult in field environments. Flow rates can vary slightly during the course of a test draft due to factors such as changes in system pressure and the number of other devices in use within the system. If the inspector or service agent sets the flow rate exactly at the marked minimum flow rate, such variations can result in the flow rate dropping below the marked minimum flow rate for portions of the test. This could potentially result in an unfair test to the metering system. Additionally, it is sometimes difficult to control the flow rate during the course of the entire test or to even set the flow rate at "exactly" the marked minimum rate. The proposed language would provide flexibility to the inspector or service agent to conduct a special test "at" or "near" the marked minimum and still consider such a test to be valid.

This proposal would provide consistency with 2015 NIST HB 44 Section 3.30. Liquid-Measuring Devices Code, Special Tests, paragraph N.4.2.4. Special Tests, Wholesale Devices.

2016 NCWM Interim Meeting:
At the Committee's 2016 NCWM Interim Meeting open hearings, Mrs. Tina Butcher (OWM) noted that OWM had submitted this proposal to align requirements in the LPG and Anhydrous Ammonia Liquid-Measuring Devices Code with those adopted in the LMD Code in 2014. The proposed changes would help to avoid testing below the marked minimum flow rate and avoid challenges when running a "slow-flow test" at a rate other than the marked minimum.

Mrs. Butcher further noted that the CWMA had suggested additional specificity for the term "slightly above." OWM agrees that this would be beneficial and supports such development. However, the proposed language is the same as that which was adopted by the NCWM in the LMD Code and is only intended to harmonize the two codes. Prior to the 2014 adoption of the same term in the LMD Code, the NCWM S&T Committee heard similar comments and acknowledged that the phrase leaves room for interpretation. The Committee felt the term is adequate and provides for flexibility, and hearing no other opposition to the proposal, presented the item for a vote with the phrase "slightly above." Lacking any specific suggestion, rather than delaying this proposal, OWM believes further definition of the term should be proposed as a separate issue that would also encompass the LMD Code.

Mrs. Butcher also indicated that OWM proposes modifying the title of this item to include "Special Tests" so that it reads "N.4.2.3. Special Tests, For Wholesale Devices." Paragraph N.4.2.3. is part of a larger paragraph titled "N.4.2. Special Tests."

Mr. Michael Keilty (Endress + Hauser Flowtec AG USA) commented that he supported the item.

Based on the comments received during the open hearings, the Committee agreed to present this item for vote at the Annual Meeting.

Regional Association Comments:
WWMA received testimony from Mr. Tina Butcher, NIST OWM, that the purpose of this proposal is to clarify that the special test should not be conducted exactly at the minimum rated flow rate as the flow rate may drop below the minimum flow rate during the test. The WWMA S&T agreed with her testimony. WWMA forwarded the item to NCWM and recommended that it be a Voting item.

CWMA believes the item is fully developed and recommended that it be a Voting item.

NEWMA recommended that this tem be a Voting item.

SWMA forwarded this item to NCWM and recommended that it be a Voting item.

Item: 3302-2
Summary of comments considered by the regional committee (in writing or during the open hearings):
No discussion, no comments. Item ready for a vote.
Item as proposed by the regional committee: ***(If different than agenda item)***
Committee recommendation to the region: ☒ Voting Item on the NCWM Agenda ☐ Information Item on the NCWM Agenda ☐ Withdraw the Item from the NCWM Agenda (*In the case of new items, do not forward to NCWM)* ☐ Developing Item on the NCWM Agenda *(To be developed by source)*
Reasons for the committee recommendation:
The NEWMA S & T Committee believes the item has been fully developed and recommends the status be Voting.
COMPLETE SECTION BELOW FOLLOWING VOTING SESSION
Final updated or revised proposal from the region: ***(If different than regional committee recommendation)***
Regional recommendation to NCWM for item status: ☒ Voting Item on the NCWM Agenda ☐ Information Item on the NCWM Agenda ☐ Withdraw the Item from the NCWM Agenda (*In the case of new items, do not forward to NCWM)* ☐ Developing Item on the NCWM Agenda *(To be developed by source)* ☐ Unable to consider at this time *(Provide explanation in the "Additional Comments" section below)*

Regional Report to NCWM: Please provide your report in this section exactly how you want it to appear in the NCWM reports to represent your region's considerations, support or opposition, and recommendations. **This will replace any previous reports from your region on this item.**
The NEWMA S & T Committee believes the item has been fully developed and recommends the status be Voting.

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

3305 MILK METERS

New-15 S.2.1. Vapor Elimination (See related items New-13, New-14, New-16 and New-17)

Source:
Liquid Controls and NIST OWM (2017)

Purpose:
Align other measuring device codes with the changes adopted in S&T LPG & NH_3 Code Item 332-3 (S.2.1. Vapor Elimination).

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

S.2.1. Vapor Elimination.

(a) A metering system shall be equipped with an effective**, ~~vapor eliminator or other~~ automatic means ~~automatic in operation~~** to prevent the passage of vapor and air through the meter.

(b) Vent lines from the air (or vapor) eliminator shall be made of **~~metal tubing or some other suitably rigid material~~ appropriate non-collapsible material**.

(Amended 2017)

Background/Discussion:
The proposed changes would ensure consistency across the various measuring device codes in NIST Handbook 44. This would help ensure more uniform interpretation of the requirements and facilitate application by officials and industry.

The proposed changes will align other codes with the following changes that were made to the LPG code at the 2016 NCWM Annual Meeting.

S.2.1. Vapor Elimination. –

(a) A device shall be equipped with an effective **automatic ~~vapor eliminator or other effective~~** means to prevent the passage of vapor through the meter.

(b) Vent lines from the vapor eliminator shall be made of appropriate non-collapsible material.

(Amended 20XX)

The proposed changes make the requirement less design-specific and more focused on ensuring that the means for eliminating air or vapor are effective, including that the vent lines not be susceptible to restriction. The proposed changes also clarify that the provision for vapor elimination must be automatic in nature in order to be considered effective.

NIST OWM in its analysis of the 2016 S&T Agenda Item referenced above suggested that a similar change be proposed, where necessary, to corresponding requirements in other measuring codes and encouraged the Committee to consider including such an item on its agenda in the 2016-2017 NCWM cycle.

Note that the Mass Flow Meters Code states "means to prevent the measurement of vapor and air" while other codes state "means to prevent the passage of vapor and air through the meter," but such distinction is probably justified. Consequently, no modifications are proposed to align this language with other codes.

Item New-15
Summary of comments considered by the regional committee (in writing or during the open hearings):
The committee groups Items 13, 14, 15, 16 and 17 together and heard comments simultaneously. Industry supports but would like to see an editorial comment. In New-13 S.2.1 would like to see the word "system" following "a liquid measuring device". The committee moves these items to voting with recommended editorial change.
Item as proposed by the regional committee: ***(If different than agenda item)***
Committee recommendation to the region: ☒ Voting Item on the NCWM Agenda ☐ Information Item on the NCWM Agenda ☐ Withdraw the Item from the NCWM Agenda (*In the case of new items, do not forward to NCWM)* ☐ Developing Item on the NCWM Agenda *(To be developed by source)*
Reasons for the committee recommendation:
The NEWMA S & T Committee recommends this item to given a Voting status.
COMPLETE SECTION BELOW FOLLOWING VOTING SESSION
Final updated or revised proposal from the region: ***(If different than regional committee recommendation)***
Regional recommendation to NCWM for item status: ☒ Voting Item on the NCWM Agenda ☐ Information Item on the NCWM Agenda ☐ Withdraw the Item from the NCWM Agenda (*In the case of new items, do not forward to NCWM)* ☐ Developing Item on the NCWM Agenda *(To be developed by source)* ☐ Unable to consider at this time *(Provide explanation in the "Additional Comments" section below)*
Regional Report to NCWM: Please provide your report in this section exactly how you want it to appear in the NCWM reports to represent your region's considerations, support or opposition, and recommendations. **This will replace any previous reports from your region on this item.**
The NEWMA S & T Committee recommends this item to given a Voting status.

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

3306 WATER METERS

New-16 S.2.2.1. Air Elimination (See related items New-13, New-14, New-15 and New-17)

Source:
Liquid Controls and NIST OWM (2017)

Purpose:
Align other measuring device codes with the changes adopted in S&T LPG & NH_3 Code Item 332-3 (S.2.1. Vapor Elimination).

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

S.2.2.1. Air Elimination.

(a) Batching meters shall be equipped with an effective**, automatic means to prevent the passage of vapor and air through the meter** ~~**air eliminator**~~**.**

(b) Vent lines from the air or vapor eliminator shall be made of appropriate non-collapsible material.

(Amended 2017)

Background/Discussion:
The proposed changes would ensure consistency across the various measuring device codes in NIST Handbook 44. This would help ensure more uniform interpretation of the requirements and facilitate application by officials and industry.

The proposed changes will align other codes with the following changes that were made to the LPG code at the 2016 NCWM Annual Meeting.

S.2.1. Vapor Elimination. –

(a) A device shall be equipped with an effective **automatic** ~~**vapor eliminator or other effective**~~ means to prevent the passage of vapor through the meter.

(b) Vent lines from the vapor eliminator shall be made of appropriate non-collapsible material.

(Amended 20XX)

The proposed changes make the requirement less design-specific and more focused on ensuring that the means for eliminating air or vapor are effective, including that the vent lines not be susceptible to restriction. The proposed changes also clarify that the provision for vapor elimination must be automatic in nature in order to be considered effective.

NIST OWM in its analysis of the 2016 S&T Agenda Item referenced above suggested that a similar change be proposed, where necessary, to corresponding requirements in other measuring codes and encouraged the Committee to consider including such an item on its agenda in the 2016-2017 NCWM cycle.

Note that the Mass Flow Meters Code states "means to prevent the measurement of vapor and air" while other codes state "means to prevent the passage of vapor and air through the meter," but such distinction is probably justified. Consequently, no modifications are proposed to align this language with other codes.

Item New-16
Summary of comments considered by the regional committee (in writing or during the open hearings):
The committee groups Items 13, 14, 15, 16 and 17 together and heard comments simultaneously. Industry supports but would like to see an editorial comment. In New-13 S.2.1 would like to see the word "system" following "a liquid measuring device". The committee moves these items to voting with recommended editorial change.
Item as proposed by the regional committee: ***(If different than agenda item)***
Committee recommendation to the region: ☒ Voting Item on the NCWM Agenda ☐ Information Item on the NCWM Agenda ☐ Withdraw the Item from the NCWM Agenda (*In the case of new items, do not forward to NCWM)* ☐ Developing Item on the NCWM Agenda *(To be developed by source)*
Reasons for the committee recommendation:
The NEWMA S & T Committee recommends this item to given a Voting status.
COMPLETE SECTION BELOW FOLLOWING VOTING SESSION
Final updated or revised proposal from the region: ***(If different than regional committee recommendation)***
Regional recommendation to NCWM for item status: ☒ Voting Item on the NCWM Agenda ☐ Information Item on the NCWM Agenda ☐ Withdraw the Item from the NCWM Agenda (*In the case of new items, do not forward to NCWM)* ☐ Developing Item on the NCWM Agenda *(To be developed by source)* ☐ Unable to consider at this time *(Provide explanation in the "Additional Comments" section below)*
Regional Report to NCWM: Please provide your report in this section exactly how you want it to appear in the NCWM reports to represent your region's considerations, support or opposition, and recommendations. **This will replace any previous reports from your region on this item.**
The NEWMA S & T Committee recommends this item to given a Voting status.

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

3307 MASS FLOW METERS

New-17 S.3.3. Vapor Elimination (See related items New-13, New-14, New-15 and New-16)

Source:
Liquid Controls and NIST OWM (2017)

Purpose:
Align other measuring device codes with the changes adopted in S&T LPG & NH_3 Code Item 332-3 (S.2.1. Vapor Elimination).

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

S.3.3. Vapor Elimination.

(a) A liquid-measuring instrument or measuring system shall be equipped with an effective**,** **automatic** ~~**vapor or air eliminator or other effective**~~ means~~**, automatic in operation,**~~ to prevent the measurement of vapor and air.

(b) Vent lines from the air or vapor eliminator **if present** shall be made of ~~**metal tubing or some other suitable rigid material**~~ **appropriate non-collapsible material**.

(Amended 1999 **and 2017**)

S.3.3.1. Vapor Elimination on Loading Rack Liquid Metering Systems.

(a) A loading rack liquid metering system shall be equipped with ~~**a vapor or air eliminator or other**~~ **an effective,** automatic means to prevent the passage of vapor and air through the meter**. Such means might include, but is not limited to a** ~~**unless the**~~ system **that is** designed or operationally controlled by a method, approved by the weights and measures jurisdiction having statutory authority over the device, such that neither air nor vapor can enter the system.

(b) Vent lines from the air or vapor eliminator (if present) shall be made of **appropriate non-collapsible** ~~**metal tubing or other rigid**~~ material.

(Added 1995)
(Amended 2017)

Background/Discussion:
The proposed changes would ensure consistency across the various measuring device codes in NIST Handbook 44. This would help ensure more uniform interpretation of the requirements and facilitate application by officials and industry.

The proposed changes will align other codes with the following changes that were made to the LPG code at the 2016 NCWM Annual Meeting.

S.2.1. Vapor Elimination. –

(a) A device shall be equipped with an effective **automatic** ~~**vapor eliminator or other effective**~~ means to prevent the passage of vapor through the meter.

(b) Vent lines from the vapor eliminator shall be made of appropriate non-collapsible material.

(Amended 20XX)

The proposed changes make the requirement less design-specific and more focused on ensuring that the means for eliminating air or vapor are effective, including that the vent lines not be susceptible to restriction. The proposed changes also clarify that the provision for vapor elimination must be automatic in nature in order to be considered effective.

NIST OWM in its analysis of the 2016 S&T Agenda Item referenced above suggested that a similar change be proposed, where necessary, to corresponding requirements in other measuring codes and encouraged the Committee to consider including such an item on its agenda in the 2016-2017 NCWM cycle.

Note that the Mass Flow Meters Code states "means to prevent the measurement of vapor and air" while other codes state "means to prevent the passage of vapor and air through the meter," but such distinction is probably justified. Consequently, no modifications are proposed to align this language with other codes.

Item New-17
Summary of comments considered by the regional committee (in writing or during the open hearings):
The committee groups Items 13, 14, 15, 16 and 17 together and heard comments simultaneously. Industry supports but would like to see an editorial comment. In New-13 S.2.1 would like to see the word "system" following "a liquid measuring device". The committee moves these items to voting with recommended editorial change.
Item as proposed by the regional committee: ***(If different than agenda item)***
Committee recommendation to the region: ☒ Voting Item on the NCWM Agenda ☐ Information Item on the NCWM Agenda ☐ Withdraw the Item from the NCWM Agenda (*In the case of new items, do not forward to NCWM)* ☐ Developing Item on the NCWM Agenda *(To be developed by source)*
Reasons for the committee recommendation:
The NEWMA S & T Committee recommends this item to given a Voting status.
COMPLETE SECTION BELOW FOLLOWING VOTING SESSION
Final updated or revised proposal from the region: ***(If different than regional committee recommendation)***
Regional recommendation to NCWM for item status: ☒ Voting Item on the NCWM Agenda ☐ Information Item on the NCWM Agenda ☐ Withdraw the Item from the NCWM Agenda (*In the case of new items, do not forward to NCWM)* ☐ Developing Item on the NCWM Agenda *(To be developed by source)* ☐ Unable to consider at this time *(Provide explanation in the "Additional Comments" section below)*
Regional Report to NCWM: Please provide your report in this section exactly how you want it to appear in the NCWM reports to represent your region's considerations, support or opposition, and recommendations. **This will replace any previous reports from your region on this item.**
The NEWMA S & T Committee recommends this item to given a Voting status.

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

3307-1 D N.3. Test Drafts.

Source:
Endress + Hauser Flowtec AG USA (2015)

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

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

N.3. Test Drafts. –

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

N.3.2. Transfer Standard 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.

NOTE: The development of this item was assigned to Michael Keilty of Endress + Hauser Flowtec AG USA. In the fall of 2016, Mr. Keilty updated the Item under Consideration. See the Background/Discussion for this item in Appendix A to view the original proposed amendments.

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

Michael Keilty
Endress + Hauser Flowtec AG USA
970-586-2122
michael.keilty@us.endress.com

Background / Discussion:
In the fall of 2016, Mr. Keilty provided an update to the Item under Consideration. That update appears in the agenda. The previous proposed Item under Consideration was as follows:

N.3. Test Drafts. –

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

N.3.2. Transfer Standard Test. – When comparing a meter with a calibrated transfer standard, the test draft shall be equal to at least the amount delivered by the device in 2 minutes at its maximum discharge rate.

The use of transfer standards is recognized in code sections 3.34 Cryogenic Liquid-Measuring Devices Code and 3.38 Carbon Dioxide Liquid-Measuring Devices Code and 3.39 Hydrogen Gas-Measuring Devices – Tentative Code. Field evaluation of LPG meters and CNG dispensers and LNG dispensers is very difficult using volumetric and gravimetric field standards and methods. The tolerances for these applications are such that using transfer meter standards are more efficient and safer. With CNG and LNG and LPG applications, the transfer standard meters are placed in-line with the delivery system as it is used to fill tanks and vehicles. The use of transfer standards eliminates return to storage issues. The use of transfer standard meters is easier and faster compared to the use of

traditional field standards. The cost of using transfer standards and transporting them is much less than the cost of traditional field provers and standards. Recognition in Handbook 44 will enable States to allow transfer standard meters to place systems into service and for field enforcement.

The amended language is made to clarify the minimum test quantity for using transfer standard meters accommodating both large quantity and low quantity delivery systems.

Volumetric field provers and gravimetric field proving are susceptible to environmental influences. The States commonly use meters as transfer standards to test rack meters.

In some applications, transfer standard meters are not more accurate than the meters used in the dispenser. For that reason, longer test drafts and possibly more tests need to be run.

The State of California is purported to have conducted a short study of master meters in the past. The conclusion did not lead to wide adoption of the practice. However, the State of California uses a mass flow meter as a master meter for carbon dioxide flowmeter enforcement.

Section 3.37 Mass Flow Meters user requirement U.R.3.8. Return of Product to Storage, Retail Compressed Natural Gas Dispensers requires that the natural gas which is delivered into the test container must be returned to storage. This is difficult and most often not complied with when the test vessel contents are released to atmosphere.

The submitter recommends that NIST update EPO 28 for CNG dispensers and EPO 26 for LPG Liquid Measuring Systems to include transfer standard meter tests. NIST Publication R 105-4 should also be revised to specifically address the transfer standard meter and the requirements for use.

The S&T Committee might also consider amending Sections 3.30 Liquid-Measuring Devices Code and 3.31 Vehicle-Tank Meters Code to allow transfer standard meters.

2015 NCWM Interim Meeting
At the 2015 NCWM Interim Meeting, the Committee agreed to group together Agenda Items 330-2 and 337-3 since these items are related and announced that comments on both items would be taken together during the open hearings. Refer to Agenda Item 330-2 for a summary of the comments heard concerning these two items. The Committee agreed this item has merit and recommends the submitter of these items work with OWM by providing data for the WG to consider in determining the suitability of the master meter transfer standard as a standard in testing another device.

2015 NCWM Annual Meeting:
At the 2015 NCWM Annual Meeting, the Committee agreed to group together Agenda Items 332-2 and 337-3 and took comments on the two items simultaneously. See Agenda Item 332-1 for a summary of comments received on these two items. In consideration of the comments received in support of the two agenda items, the Committee agreed to maintain the Developing status of both items.

Regional Association Comments:
WWMA did not receive comments during open hearings. The WWMA S&T Committee sees possible merit in the proposal but believes that refinements and more test data are needed before further consideration can be given to this item. WWMA recommended that it remain as a Developing item.

CWMA believes believed this item has merit and the comments received were in support of the use of transfer standards once the proper procedures have been developed to insure accuracy, traceability, and suitability. CWMA recommended that this item be a Developing item.

NEWMA recommended this item be changed from a Voting Item to an Information Item at the 2016 NCWM Annual Meeting.

SWMA batched this item with Item 332-5 and heard them together. SWMA recommends that these items be Voting items.

2016 NCWM Interim Meeting:
At the 2016 NCWM Interim Meeting, the Committee grouped Items 332-5 and 337-3 together and comments were taken simultaneously on these two items. See Item 332-5 for a summary of the comments received during the Committee's open hearings and the Committee's discussions and considerations concerning these two items. Based on the comments received during the open hearings, the Committee agreed to present both items for vote at the Annual Meeting.

2016 NCWM Annual Meeting:
At the 2016 NCWM Annual Meeting, the Committee grouped Items 332-5 and 337-3 together and comments were taken simultaneously on these two items. See Agenda Item 332-5 for a summary of comments heard on these two items. In consideration of the comments, the Committee agreed by majority to downgrade the status of these two items to Developing and return them to the submitter.

Item: 3307-1
Summary of comments considered by the regional committee (in writing or during the open hearings):
The committee grouped this Item with 3302-1. Multiple comments heard recommending a withdrawal of this item; transfer meter standards are not calibrated devices. Multiple comments heard advising that this should be developed as it had merit. Vote was taken between the two but was tied. It was proposed that we give the item another year to develop as it is still fairly new. If no more data is added it will be withdrawn.
Item as proposed by the regional committee: ***(If different than agenda item)***
Committee recommendation to the region: ☐ Voting Item on the NCWM Agenda ☐ Information Item on the NCWM Agenda ☐ Withdraw the Item from the NCWM Agenda (*In the case of new items, do not forward to NCWM)* ☒ Developing Item on the NCWM Agenda *(To be developed by source)*
Reasons for the committee recommendation:
The NEWMA S & T committee forwards this item as developing for one more year cycle (2017).
COMPLETE SECTION BELOW FOLLOWING VOTING SESSION
Final updated or revised proposal from the region: ***(If different than regional committee recommendation)***
Regional recommendation to NCWM for item status: ☐ Voting Item on the NCWM Agenda ☐ Information Item on the NCWM Agenda ☐ Withdraw the Item from the NCWM Agenda (*In the case of new items, do not forward to NCWM)* ☒ Developing Item on the NCWM Agenda *(To be developed by source)* ☐ Unable to consider at this time *(Provide explanation in the "Additional Comments" section below)*
Regional Report to NCWM: Please provide your report in this section exactly how you want it to appear in the NCWM reports to represent your region's considerations, support or opposition, and recommendations. **This will replace any previous reports from your region on this item.**
The NEWMA S & T committee forwards this item as developing for one more year cycle (2017).

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

3504 TAXIMETERS

New 12 A.2. Exceptions. (See related item New-11)

Source:
USNWG on Taximeters (2017)

Purpose:
Clarify that the Taximeters Code does not apply to Transportation Network Measuring Systems, which would fall under a new tentative code specifically for those systems.

Item under Consideration:
Amend NIST Handbook 44 Taximeter Code as follows:

A.2. Exceptions. – This code does not apply to;

a) Odometers on vehicles that are rented on a distance basis (for which see Section 5.53. Code for Odometers)

b) Devices that only display a flat rate or negotiated rate.**; or**

c) Transportation Network Measurement Systems (for which see Section 5.XX Transportation Network Measurement Systems).

(Amended 1977 **and 20XX**)

Background/Discussion:
Proposed change (1):

The appearance of new types of transportation-for-hire services that use location services (such as GPS) and software applications as an interface for the user and provider of the service has created a need for regulatory standards that could be applied to these types of systems. These systems, being referred to as Transportation Network Measurement Systems (TNMS) do not use a conventional "taximeter" or other dedicated hardware devices that conform to the more traditional design of taximeters however, they provide a similar transportation-for-hire service. Regulatory officials have met with little or no success in attempts to apply existing standards (including those in Section 5.54 Taximeters Code) to TNMS due to differences in the design of these systems and other, existing types of transportation-for-hire services. The hardware components used in TNMS are devices (cellular telephones, computers, tablets) that are typically owned/possessed by the drivers and passengers using the systems and are not designed, sold, issued, or otherwise provide by the Transportation Network Companies. Since there is an absence of dedicated physical hardware used in these systems and because the primary components that are integral to the TNMS consist of various software programs, many members of the weights and measures community and transportation industry have concluded that a new documentary standard, separate from the existing Taximeters Code, is needed.

TNMS have established a large customer base in the transportation-for-hire marketplace and these systems are used extensively in the U.S. as well as internationally. There is a preponderance of public and political support to recognize and accept TNMS as fair-market competition to traditional taxi services. To that point, reasonable and appropriate standards that can be applied for the evaluation of TNMS as commercial systems must be developed and implemented. Primary goals of the implementation of a TNMS code (as well as corresponding changes to the Taximeters code) are to ensure a level playing field within this industry, ensure fair and equitable transactions, ensure transparency for consumers, and to facilitate value comparisons.

The USNWG on Taximeters has worked on the updating of the NIST HB44 Taximeters Code as well as the development of appropriate requirements for transportation systems using location services and software applications since the later portion of 2012. More recently, Transportation Network Companies (TNCs) that are the providers of TNMS have joined this effort and added their input into the standards development process. Because

there are instances where taximeters are now being designed to operate using similar features and functionality as TNMS, the USNWG on Taximeters has also developed corresponding changes to the NIST HB44 Taximeters Code in an effort to provide a regulatory parity between these transportation-for-hire industry competitors. Those proposed changes to the Taximeters Code will be submitted under a separate item that already appears on the Committee's agenda (Item 3504-1 on the Committee's 2017 draft agenda) as a "carryover" item.

Proposed change (2):

Anticipating that the proposal to add a new Transportation Network Measurement Systems Code in HB44 will be adopted, there will be a corresponding need to clarify that the existing HB44, 5.54. Taximeters Code will not be applicable to these types of systems. The addition of an exemption under paragraph A.2. in the current Taximeters Code for transportation network measurement systems (TNMS) will make this clear. While this amendment to provide an exemption for TNMS in the current Taximeters Code is to be proposed also under a different agenda item (Item 3504-1, as described above), it is essential that this proposed change be a part of the TNMS item as well. This will help avoid any conflict and confusion regarding the application of the proposed tentative code should this other agenda item should a decision be made to reject or delay Item 3504-1.

Some in the weights and measures community and the transportation-for-hire industry have opposed the development of a new separate HB44 Code for TNMS stating that since those systems perform the same function as a taximeter, TNMS should be assessed based on requirements already existing in the HB44 Taximeters Code. Additional arguments that cite the lack of regulatory standards for TNMS are pointing out the loss of revenue of the traditional-type taxi services due to the increase of competition from TNMS operating in the same jurisdiction. The loss of business being reported by some in the taxi industry has also reportedly resulted in a severe decrease of the value of medallions in many areas where medallions are purchased by taxi companies as a prerequisite to operate in those particular jurisdictions.

Because these system's design and functions are considerably different from the current design of today's taximeters, there are differences between the proposed new HB44 TNMS Code and requirements that are already in (or are proposed to be added to) the existing HB44 Taximeters Code. Some may view the differences between these standards as being unfair and as providing advantages to one over the other; however, the changes that are being proposed under Item 3504-1 should bring the two codes into closer alignment. Additionally, this does not preclude the possibility of a future proposal to merge the two codes as technology evolves.

Item New-12
Summary of comments considered by the regional committee (in writing or during the open hearings):
The committee grouped this Item New 12 with New 11. These items were described as a work in progress as tentative code. It is important for it to move forward and be updated as needed. There was a lot of support from both state and industry. Committee moves to a voting item.
Item as proposed by the regional committee: ***(If different than agenda item)***
Committee recommendation to the region: ☒ Voting Item on the NCWM Agenda ☐ Information Item on the NCWM Agenda ☐ Withdraw the Item from the NCWM Agenda (*In the case of new items, do not forward to NCWM)* ☐ Developing Item on the NCWM Agenda *(To be developed by source)*
Reasons for the committee recommendation:
The NEWMA S & T Committee appreciates the hard work and many meetings of the USNWG on Taximeters and recommends the item be Voting.
COMPLETE SECTION BELOW FOLLOWING VOTING SESSION
Final updated or revised proposal from the region: ***(If different than regional committee recommendation)***

Regional recommendation to NCWM for item status:

- ☒ Voting Item on the NCWM Agenda
- ☐ Information Item on the NCWM Agenda
- ☐ Withdraw the Item from the NCWM Agenda (*In the case of new items, do not forward to NCWM)*
- ☐ Developing Item on the NCWM Agenda *(To be developed by source)*
- ☐ Unable to consider at this time *(Provide explanation in the "Additional Comments" section below)*

Regional Report to NCWM:

Please provide your report in this section exactly how you want it to appear in the NCWM reports to represent your region's considerations, support or opposition, and recommendations. **This will replace any previous reports from your region on this item.**

The NEWMA S & T Committee appreciates the hard work and many meetings of the USNWG on Taximeters; the item is ready to be launched and recommends the item is Voting.

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

3504-1 D USNWG on Taximeters – Taximeter Code Revisions and Global Positioning System-Based Systems for Time and Distance Measurement

Note: This item was originally titled "Item 360-5 S.5. Provision for Security Seals" in the Committee's 2013 Interim Agenda. At the 2013 NCWM Interim Meeting, the Committee combined that item with "Item 354-1 Global Positioning Systems for Taximeters" and "Item 360-6 Global Positioning Systems for Taximeters" to create this new, consolidated item to address the development of recommendations on multiple topics related to taximeters and GPS-based time and distance measuring systems.

Source:
NIST USNWG on Taximeters

Purpose:
Revise the Taximeters Code to be applicable and appropriate for current technology and eliminate disparities between this code and the newly proposed Transportation Network Measuring Systems Code.

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

Section 5.54. Taximeters

A. Application

A.1. General. – This code applies to taximeters; that is, to devices that automatically calculates at a predetermined rate or rates and indicate the charge for hire of a vehicle.

A.2. Exceptions. – This code does not apply to:

(a) Odometers on vehicles that are rented on a distance basis (for which see Section 5.53. Code for Odometers).
(b) Devices that only display a flat rate or negotiated rate.
(c) **Transportation Network Measurement Systems (for which see Section 5.XX. Transportation Network Measurement Systems).**

(Amended 1977**,** ~~and~~ 2016**, and 20XX**)

A.3. Additional Code Requirements. – In addition to the requirements of this code, Taximeters shall meet the requirements of Section 1.10. General Code.

S. Specifications

S.1. Design of Indicating and Recording Elements.

S.1.1. General. – A taximeter shall be equipped with a primary indicating element.
(Amended 1988 and 2015)

S.1.1.1. Recording Elements. *– A receipt providing information as required in S.1.9. Recorded Representations shall be available from a taximeter or taximeter system through an integral or separate recording element for all transactions conducted.*
[Nonretroactive January 1, 2016]
(Added 2015)

S.1.2. Advancement of Indicating Elements. – Except when a taximeter is being cleared, the primary indicating and recording elements shall be susceptible of advancement only by the movement of the vehicle or by the time mechanism.

At the conclusion of a transaction (e.g., following the totalizing of all accrued charges and having a customer receipt made available), no other advancement of fare, extras or other charges shall occur until the taximeter has been cleared.
[Nonretroactive as of January 1, 2017]

Where permitted, a flat rate or negotiated rate shall be displayed in the "fare" indicating mechanism, provided that once a flat rate or negotiated rate is entered the fare may no longer be advanced by movement of the vehicle or the time mechanism.
(Amended 1988 and 2016)

S.1.2.1. Time Mechanism. – Means shall be provided on all taximeters designed to calculate fares based on a combination of time elapsed and distance traveled, to enable the vehicle operator to render the time mechanism either operative or inoperative with respect to the fare-indicating mechanism.
(Added 20XX)

S.1.2.2. Distance Mechanism. – Means shall be provided on all taximeters designed to calculate fare based on a combination of time elapsed and/or distance traveled to enable the vehicle operator to render the distance mechanism either operative or inoperative with respect to the fare-indicating mechanism.
[Nonretroactive as of January 1, 20XX]
(Added 20XX)

S.1.3. Visibility of Indications.

S.1.3.1. Taximeter Indications. – The indications of fare, including extras, and the mode of operation, such as "time" or "hired," shall be constantly displayed whenever the meter is in operation. All indications of passenger interest shall be easily read from a distance of 1.2 m (4 ft) under any condition of normal operation. **This includes any necessary lighting, shading or other means necessary to make displayed indications clearly visible to operator and passenger.**
(Amended 1977, 1986, ~~and~~ 1988 **and 20XX**)

S.1.3.~~1~~2. Minimum Height of Figures, Words, and Symbols. – The minimum height of the figures used to indicate the fare shall be 10 mm and for extras, 8 mm. The minimum height of the figures, words, or symbols used for other indications, including those used to identify or define, shall be 3.5 mm.

(Added 1986)

~~***S.1.3.2. Lighting of Indications. Integral lighting shall be provided to illuminate the fare, extras, the rate or rate code, and the taximeter status (i.e., vacant, hired, and time off).***~~
~~***[Nonretroactive as of January 1, 1989]***~~

~~**(Added 1988) (Amended 1990)**~~

S.1.3.3. Passenger's Indications. *– A supplementary indicating element installed in a taxi to provide information regarding the taxi service to the passenger* ***(i.e., Passenger Information Monitor or PIM)****, shall clearly display the current total of all charges incurred for the transaction. The accruing total of all charges must remain clearly visible on the passenger's display (unless disabled by the passenger) at all times during the transaction.*
[Nonretroactive as of January 1, 2016]

(Added 2015) **(Amended 20XX)**

S.1.3.3.1. Additional Information. *– Additional information shall be displayed or made available through a passenger's indicating element (as described in S.1.3.3. Passenger's Indications) and shall be current and reflect any charges that have accrued. This additional information shall include:*

(a) an itemized account of all charges incurred including fare, extras, and other additional charges; and

(b) the rate(s) in use at which any fare is calculated.

Any additional information made available must not obscure the accruing total of charges for the taxi service. This additional information may be made accessible through clearly identified operational controls (e.g., keypad, button, menu, touch-screen).
[Non retroactive as of January 1, 2016]

(Added 2015)

S.1.3.3.2. Fare and Extras Charges. *– The indication of fare and extras charges on a passenger's indicating element shall agree with similar indications displayed on all other indicating elements in the system.*

[Nonretroactive as of January 1, 2016]

(Added 2015)

S.1.4. Actuation of Fare-Indicating Mechanism. – When a taximeter designed to calculate fares upon the basis of a combination of distance traveled and time elapsed **but not both time and distance used concurrently to calculate fare,** is operative with respect to fare indication, the fare-indicating mechanism shall be actuated by the distance mechanism whenever the vehicle is in motion at such a speed that the rate of distance revenue equals or exceeds the time rate, and may be actuated by the time mechanism whenever the vehicle speed is less than this and when the vehicle is not in motion. ~~**Means shall be provided for the vehicle operator to render the time mechanism either operative or inoperative with respect to the fare-indicating mechanism.**~~

(Amended 1977 **and 20XX**)

S.1.5. Operating Condition.

S.1.5.1. General. – When a taximeter is cleared, the indication "Not Registering," "Vacant," or an equivalent expression shall be shown. Whenever a taximeter is set to register charges, it shall indicate

"Registering," "Hired," or an equivalent expression and the rate at which it is set shall be automatically indicated (Rate 1 or Rate A, for example).

(Amended 1988)

S.1.5.2. Time not Recording. – When a taximeter is set for fare registration with the time mechanism inoperative, it shall indicate "Time Not Recording" or an equivalent expression.

(Amended 1988)

S.1.5.3. Distance not Recording. - When a taximeter is set for fare registration with the distance mechanism inoperative, it shall indicate "Distance Not Recording" or an equivalent expression.

[Nonretroactive as of January 1, 20XX]

(Added 20XX)

S.1.6. Fare Identification. – Fare indications shall be identified by the word "Fare" or by an equivalent expression. Values shall be defined by suitable words or monetary signs.

S.1.7. Extras. – Extras shall be indicated as a separate item and shall not be included in the fare indication. They shall be identified by the word "Extras" or by an equivalent expression. Values shall be defined by suitable words or monetary signs. Means may be provided to totalize the fare and extras if the totalized amount returns to separate indications of fare and extras within 5 seconds or less.

(Amended 1988)

S.1.7.1. Nonuse of Extras. – If and when taximeter extras are prohibited by legal authority or are discontinued by a vehicle operator, the extras mechanisms shall be rendered inoperable or the extras indications shall be effectively obscured by permanent means.

S.1.8. Protection of Indications. – All indications of fare and extras shall be protected from unauthorized alteration or manipulation.

(Amended 2015)

S.1.9. Recorded Representation. *– A printed* ***or electronic*** *receipt issued from a taximeter, whether through an integral or separate recording element, shall include as a minimum, the following information when processed through the taximeter system:*

(a) date;

*(b) unique vehicle identification number, such as the medallion number, taxi number, vehicle identification number (VIN), permit number, or other identifying information as specified by the statutory authority;**

*(c) start and end time of the trip;**

*(d) distance traveled, maximum increment of 0.1 km (0.1 mi);**

(e) fare in $;

*(f) each rate at which the fare was computed and the associated fare at that rate;**

*(g) additional charges (in $) where permitted such as extras, any surcharges, telecommunication charges, and taxes shall be identified and itemized;**

*(h) total charge for service in $ (inclusive of fare, extras, and all additional charges);**

*(i) trip number, if available;*** ~~***and***~~

*(j) telephone number (or other contract information) for customer assistance~~.~~**;**** ***and***

(k) a statement of chargeable time and chargeable distance for taximeters that calculate fare using time and distance concurrently.**

Note: When processed through the taximeter or taximeter system, any adjustments (in $) to the total charge for service including discounts, credits, and tips shall also be included on the receipt.**
*[Nonretroactive as of January 1, 1989] *[Nonretroactive as of January 1, 2000]*
[Nonretroactive as of January 1, 2016] ***[Nonretroactive as of January 1, 20XX]***
(Added 1988) (Amended 1999 and 2015)

S.1.9.1. Multiple Recorded Representations.

S.1.9.1.1. Duplicate Receipts. *– A recording element may produce a duplicate receipt for the previous transaction provided the information printed is identical to the original with the exception of time issued. The duplicate receipt shall include the words "duplicate" or "copy." The feature to print a duplicate receipt shall be deactivated at the time the meter is hired for the next fare.*
[Nonretroactive as of January 1, 2000]
(Added 1999)

S.1.10. Non-fare Information. *– The fare and extras displays may be used to display auxiliary information provided the meter is in the vacant condition and such information is only displayed for10 seconds, or less. If the information consists of a list of information, the list may be displayed one item after another, provided that each item is displayed for 10 seconds, or less.*
[Nonretroactive as of January 1, 2002]
(Added 2000)

S.2. Basis of Fare Calculations. – A taximeter shall calculate fares only upon the basis of:

(a) distance traveled;

(b) time elapsed; or

(c) a combination of distance traveled and time elapsed.

A taximeter may utilize more than one rate to calculate the fare during a trip. Any change in the applied rate must occur at the completion of the current interval.
(Amended 1977 and 2016)

S.2.1. Initial Time and Distance Intervals. – The time and distance intervals of a taximeter **that does not calculate fares based on distance travelled and time elapsed used concurrently** shall be directly proportional as expressed in the following formula:

$$\frac{Seconds\ of\ \ Initial\ Time\ Interval}{Seconds\ per\ Non-Initial\ Time\ Interval} = \frac{Distance\ of\ \ Initial\ Mileage\ Interval}{Distance\ per\ Non-Initial\ Mileage\ Interval}$$

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

S.3. Design of Operating Control.

S.3.1. Positions of Control. – The several positions of the operating controls shall be clearly defined and shall be so constructed that accidental or inadvertent changing of the operating condition of the taximeter is improbable. Movement of the operating controls to an operating position immediately following movement to the cleared position shall be delayed enough to permit the taximeter to come to a complete rest in the cleared position.

(Amended 1988)

S.3.2. Control for Extras Mechanism. – The knob, handle, or other means provided to actuate the extras mechanism shall be inoperable whenever the taximeter is cleared.

S.4. Interference. – The design of a taximeter shall be such that **when a fare is calculated by using time and/or by using distance (but not used concurrently)** there will be no interference between the time and the distance portions of the mechanism device at any speed of operation.

(Amended 1977**,** ~~**and**~~ 1988 **and 20XX**)

~~**S.5. Provision for Security Seals. Adequate provision shall be made to provide security for a taximeter. Security may be provided either by:**~~

~~**(a) Affixing security seals to the taximeter and to all other components required for service operation of a complete installation on a vehicle, so that no adjustments, alterations, or replacements affecting accuracy or indications of the device or the assembly can be made without mutilating the seal or seals; or**~~

~~**(b) Using a combination of security seals described in paragraph (a) and, in the case of a component that may be removed from a vehicle (e.g., slide mounting the taximeter), providing a physical or electronic link between components affecting accuracy or indications of the device to ensure that its performance is not affected and operation is permitted only with those components having the same unique properties.**~~

~~**The sealing means shall be such that it is not necessary to disassemble or remove any part of the device or of the vehicle to apply or inspect the seals.**~~

~~**(Amended 1988 and 2000)**~~

S.5. Provisions for Security Sealing. - Adequate provision shall be made for an approved means of security (e.g., data change audit trail) or physically applying security seals in such a manner that requires the security seal to be broken before an adjustment or interchange can be made of:

(a) any metrological parameter affecting the metrological integrity of the taximeter and associated equipment; or

(b) any metrological parameter controlled by software residing in the taximeter or an associated external computer network.

When applicable, the adjusting mechanism shall be readily accessible for purposes of affixing a security seal.
[Audit trails shall use the format set forth in Table S.5.]

S.5.1. Taximeters Connected to Networked Systems. - Metrological features that are not located on the taximeter device installed in the vehicle (i.e., accessed through a computer network, server, or "cloud") shall be secured by means that will:

(a) protect the integrity of metrological data and algorithms used to compute fares from such data against unauthorized modification; and

(b) use software-based access controls or equivalent technological protections that limit access to metrological data and algorithms used to compute fares from such data only to authorized persons.

S.5.2. Taximeters Calibrated to Specific Vehicles. - In the case of taximeters where the proper performance and calibration of the device has been verified when used in a specific vehicle and which may be removed from the vehicle (e.g., slide mounting the taximeter), means shall be provided through a physical seal or electronic link between components affecting accuracy or indications of the device to ensure that its performance is not affected and operation is permitted only with those components having the same unique properties.

Table S.5. Categories of Devices and Methods of Sealing	
Categories of Device	***Methods of Sealing***
Category 1: No remote configuration capability.	***Seal by physical seal or a combination of physical seals and for components that may be removed from the vehicle, a physical or electronic link as described in S.5.3. Taximeters Calibrated to Specific Vehicles***
Category 2: Remote access to adjustable parameters, 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. The device shall not operate as normal when in the configuration mode.***	***The hardware enabling access for remote access to calibration functions must be at the device and sealed using a physical seal and also include an event logger.*** ***An event logger must also be used to record changes to configuration parameters made through remote access.*** ***The event loggers must include event counters (minimum count of 1000 events), the parameter ID, the date and time of the change, and the new value of the parameter. A printed or electronic copy of the information must be available through the device. The event loggers 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.)***
Category 3: Remote access to adjustable parameters. ***Remote access to adjustable parameters may be unlimited or controlled through a software switch (e.g., password).*** ***The device shall clearly indicate that it is in the remote configuration mode and record such message if capable of printing in this mode. The device shall not operate as normal when in the configuration mode.***	***An event logger must also be used to record changes to adjustable parameters that are made through remote access and which is accessible only by authorized persons (using an internet web browser or other such secure software.*** ***The event logger shall include event counters, the date and time of the change, the parameter ID and the new value of the parameter. A printed or electronic copy of the information must be available through the device. The event loggers 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.)*** ***The device shall become inoperable when access to the system's metrological parameters is made through unapproved or unauthorized means. The device shall remain inoperable until cleared by the official having statutory authority.***

[Nonretroactive as of January 1, 20XX]

S.6. Power Interruption, Electronic Taximeters.

(a) After a power interruption of 3 seconds or less, the fare and extras indications shall return to the previously displayed indications and may be susceptible to advancement without the taximeter being cleared.

(b) After a power interruption exceeding 3 seconds, the fare and extras indications shall return to the previously displayed indications and shall not be susceptible to advancement until the taximeter is cleared.

*After restoration of power following an interruption exceeding 3 seconds, the previously displayed fare shall be displayed for a maximum of 1 minute at which time the fare shall automatically clear and the taximeter shall return to the vacant condition.**
*[*Nonretroactive as of January 1, 2002]*
(Added 1988) (Amended 1989, 1990, and 2000)

S.7. Measurement Signal Loss. – In the event that the measurement signal is interrupted, the taximeter shall be capable of determining any information needed to complete a transaction in progress at the time of signal loss/interruption.

Note: If the meter ceases to increment fare based on distance, the taximeter may continue to increment fare based on elapsed time if the time mechanism is not affect by signal loss.

S.7.1. Intermittent Trip Data Loss. – When the measurement signal is lost intermittently during a trip (e.g., traveling through a tunnel) but recovered prior to the end of the trip, the taximeter shall be capable of calculating an accurate fare in accordance with T.1. Tolerance Values.

S.7.2. Significant Trip Data Loss. – When the signal is lost for a significant portion of the trip, the taximeter shall calculate the total charge utilizing recorded time and distance measurements and other charges (e.g., tolls and airport fees), and may also include other means in accordance with the terms of service (or other agreement) the passenger has agreed to.

Note: Significant trip data loss refers to instances when the measurement signal is lost to the extent that the taximeter cannot perform an accurate measurement or when the signal is not regained by the end of the trip.

(Added 20XX)

S.~~7~~8. Anti-Fraud Provisions, Electronic Taximeters. – An electronic taximeter may have provisions to detect and eliminate distance input that is inconsistent with **~~output of the vehicle's distance sensor~~the taximeters's source(s) of distance measurement data**. When a taximeter equipped with this feature detects input inconsistent with the distance **~~sensor~~measurement data source(s)**:

(a) The meter shall either filter out the inconsistent distance input signals or cease to increment fare based on distance until the distance input signal **~~returns to normal~~ is restored to normal operation**. If the meter ceases to increment fare based on distance, the taximeter may continue to increment fare based on elapsed time **where permitted by the statutory authority and if the time mechanism is not affected by inconsistent signals**;

(b) The taximeter shall provide a visible or audible signal that inconsistent input signals are being detected; and

(c) The taximeter shall record the occurrence in an event logger. The event logger shall include an event counter **~~(000 to 999)~~**, the date, and the time of at least the last 1000 occurrences.

(Added 2001) **(Amended 20XX)**

N. Notes

N.1. Distance Tests.

N.1.1. Test Methods. – To determine compliance with distance tolerances, a distance test of a taximeter shall be conducted utilizing one or more of the following test methods:

(a) **Road Test.** – A road test consists of driving the vehicle over a precisely measured road course.

(b) **Fifth-Wheel Test.** – A fifth-wheel test consists of driving the vehicle over any reasonable road course and determining the distance actually traveled through the use of a mechanism known as a "fifth wheel" that is attached to the vehicle and that independently measures and indicates the distance.

(c) **Simulated-Road Test*.** – A simulated road test consists of determining the distance traveled by use of a roller device, or by computation from rolling circumference and wheel-turn data.

*** Simulated-road testing is not appropriate for taximeters using measurement data from sources other than signal(s) generated by rotation of the wheels of the vehicle.**

(Amended 1977 **and 20XX**)

N.1.2. Test Procedures. – The distance test of a taximeter, whether a road test, a simulated-road test, or a fifth-wheel test, shall include at least duplicate runs of sufficient length to cover at least the third money drop or 1 mi, whichever is greater, and shall be at a speed approximating the average speed traveled by the vehicle in normal service. In the case of metric-calibrated taximeters, the test should cover at least the third money drop or 2 km, whichever is greater.

(Amended 1977)

N.1.2.1. Taximeters Using Measurement Data Sources From Other Than Rotation of the Wheels. – Repeatability testing shall be conducted if during testing a taximeter registers a distance measurement that does not comply with the tolerance values in T.1.1. Distance Tests. A minimum of three additional tests shall be conducted at the same location and where all test variables are reduced to the greatest extent practicable to verify the sytems ability to repeat transaction indications. Repeatability testing performed in excess of these three additional tests is done at the discretion of the official with statutory authority.

Testing of taximeters with metrologically significant parameters that do not completely reside within the taximeter device shall include tests performed under variable conditions to verify that any non-compliant issue is generated from a network system rather than a single taximeter device. The variability tests shall include a minimum of three consecutive tests of varying lengths, locations, and/or environmental conditions.

(Added 20XX)

N.1.3. Test Conditions.

N.1.3.1. Measurement Data Based on the Rotation of the Vehicle's Wheels. – For taximeters that receive input of measurement data generated (directly or indirectly) from rotation of the vehicle's wheels, the test of the taximeter shall be performed under the following conditions.

(Added 20XX)

N.1.3.1.1 Vehicle Lading. – During the distance test of a taximeter, the vehicle shall carry two persons, or in the case of a simulated-road test, 70 kg or 150 lb of test weights may be substituted in lieu of the second person.

N.1.3.1.2. Tire Pressure. – At the completion of test run or runs, the tires of the vehicle under test shall be checked to determine that the tire pressure is that operating tire pressure posted in the vehicle.

If not, the tire pressure should be adjusted to the posted tire pressure and further tests may be conducted to determine the operating characteristics of the taximeter.

(Amended 1977 **and 20XX**)

N.1.3.2. Taximeters Using Other Measurement Data Sources. - Except during type evaluation, all tests shall be performed under conditions that are considered usual and customary for the location(s) where the system is normally operated and as deemed necessary by the statutory authority.

N.1.3.2.1. Roads. - All tests shall be conducted on public roads which are in good repair.

N.1.3.2.2 Testing for Environmental Influences. – During type evaluation, the distance test may be performed on a route traveled by the vehicle that exposes the system to conditions possibly contributing to the loss of, or interference with the signal(s) providing measurement data. This may include:

a) Objects that may obstruct or reflect signals such as tall buildings/structures, forestation, tunnels, etc.;

b) Routes that do not follow a straight-line path;

c) Significant changes in altitude; and

d) Any other relevant environmental conditions.

(Added 20XX)

N.2. Time Test. – If a taximeter is equipped with a timing device through which charges are made for time intervals, the timer shall be tested at the initial interval, four separate subsequent intervals, and an average time test of at least four consecutive subsequent time intervals.

(Amended 1988)

N.3. Interference Test. – ~~**If a taximeter is equipped with a timing device through which charges are made for time intervals**~~**For taximeters that calculate fares based on time and/or distance but not simultaneously**, a test shall be conducted to determine whether there is interference between the time and distance elements. During the interference test, the vehicle's operating speed shall be 3 km/h or 4 km/h, or 2 mi/h or 3 mi/h faster**, and then 3 km/h or 4 km/h (2mi/h or 3 mi/h) slower** than the speed at which the basic distance rate equals the basic time rate. The basic rate per hour divided by the basic rate per mile is the speed (km/h or mi/h) at which the basic time rate and basic distance rate are equal.

Note: Performance of the interference test may not be considered appropriate as a field test while travelling in a vehicle equipped with a taximeter. This test may be performed during type evaluation under controlled conditions for practicality and for safety concerns.

(Amended 1988 **and 20XX**)

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.

(b) On Underregistration: 4 % of the interval under test, with an added tolerance of 30 m or 100 ft whenever the initial interval is included in the interval under test.

T.1.2. On Time Tests.

T.1.2.1. On Individual Time Intervals. – Maintenance and acceptance tolerances on individual time intervals shall be as follows:

(a) On Overregistration: 3 seconds per minute (5 %).

(b) On Underregistration: 9 seconds per minute (15 %) on the initial interval, and 6 seconds per minute (10 %) on subsequent intervals.

T.1.2.2. On Average Time Interval Computed After the Initial Interval. – Except for the initial interval, maintenance and acceptance tolerances on the average time interval shall be as follows:

(a) On Overregistration: 0.2 second per minute (0.33 %).

(b) On Underregistration: 3 seconds per minute (5 %).

(Amended 1991)

T.1.3. On Interference Tests. - For taximeters designed to calculate fares upon the basis of a combination of distance traveled and time elapsed, but not using both simultaneously.

T.1.3.1. The **distance** registration of a taximeter in the "time on" position shall agree within 1 % of its ~~performance~~ **distance registration** in the "time off" position.

(Added 1988)

(Amended 20XX)

T.2. 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 (i.e., fifth-wheel) when compared to a basic reference standard.

(Added 20XX)

UR. User Requirements

UR.1. Inflation of Vehicle Tires. – **For taximeters that receive input of measurement data generated (directly or indirectly) from rotation of the vehicle's wheels,** ~~T~~**t**he operational tire pressure of passenger vehicles and truck tires shall be posted in the vehicle and shall be maintained at the posted pressure.

(Amended 1977 **and 20XX**)

UR.2. Position and Illumination of Taximeter. – A taximeter shall be so positioned and illuminated that its indications, operational markings, and controls of passenger interest can be conveniently read by a passenger seated ~~in the back seat of the vehicle~~ **in a position of up to 1.2 meters (4 ft.) away from the taximeter under any condition of normal operation.**

(Amended 1985~~, and~~ 1986 **and 20XX**)

UR.3. Statement of Rates. – The distance and time rates for which a taximeter is set, including the initial distance interval and the initial time interval, the local tax rate, and the schedule of extras when an extras indication is provided shall be conspicuously displayed inside the front and rear passenger compartments. The words "Rate," "Rates," or "Rates of Fare" shall precede the rate statement. The rate statement shall be fully informative, self-explanatory, and readily understandable by the ordinary passenger, and shall either be of a permanent character or be protected by glass or other suitable transparent material.

(Amended 1977, 1988, 1990, and 1999)

Appendix D

location services. – any of the various technologies used to determine the geographical location of a receiving unit in or physically attached to a vehicle. These technologies may include but are not limited to: Global Positioning Service; cellular networks; wi-fi networks. [5.54., 5.XX.]

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

John Barton
Chairman to the NIST USNWG on Taximeters
301-975-4002
john.barton@nist.gov

Background / Discussion:
The Committee has received multiple proposals over the past several years related to updating the NIST Handbook 44 Taximeters Code to reflect current technology as well as a request to establish criteria for GPS-based time and distance measuring systems. In April 2012, NIST OWM established a U.S. National Working Group to work on these issues.

The USNWG on Taximeters has submitted a number of proposed changes to the HB44 Taximeters Code over the past 2-3 years. These initial changes were focused primarily on updating the code to account for the use of more advanced equipment (e.g., Passenger Information Monitors or PIMs, Mobile Data Terminals or MDTs, credit card readers, printers).

More recently, the work group's efforts were focused on the development of standards intended for "transportation network measurement systems" (TNMS) that calculate passenger fares based on time and distance derived from location services. A characteristic of TNMS that prompted the work group to develop separate requirements was the manner in which the consumer (rider) acquired this type of service and the means provided as an interface between rider, driver, and transportation network company. This interface is typically in the form of a software application program or "app." The recognition that the TNMS are almost entirely software-based was another factor that moved the USNWG to develop a separate set of requirements for these systems. The proposal for this new TNMS code has been submitted for consideration as a new item in the S&T Committee.

During the USNWG meeting discussions, the work group members recognized that when developing new requirements for TNMS or modifying requirements for taximeters there was a potential risk of creating unintended, unfair advantages for either type of device. Since these devices are used to calculate charges for the same type of service, the work group believed that there should be a parallel set of requirements.

The USNWG members also recognized that the traditional-type of taximeters were evolving in such a way that would incorporate some of the technologies used within TNMS and that the differences between the two type of devices/system were becoming less clearly defined. This prompted the work group to develop the two separate codes in some ways where they will mirror each other in certain sections.

The USNWG has now finalized a draft for proposed changes in the NIST Handbook 44 Taximeters Code which is being submitted for consideration as a voting item. For details of those meetings as well as the details for requirements and changes to those requirements being proposed by the USNWG, please contact Mr. John Barton as noted in the "Item Under Consideration."

Regional Associations Meetings:
WWMA did not receive comments on this item during open hearings. The WWMA S&T Committee agrees with the USNWG on Taximeters that this item remain developing. The S&T Committee encourages the USNWG on Taximeters to give consideration to other applications involving services, including those covered by the Odometers Code such as towing, ambulances, deliveries, etc. WWMA recommended that this item remain Developing.

CWMA believes this item has merit but needs further development. They recommended that it remain as a Developing item.

NEWMA believes the USNWG on Taxi Meters is very close to modifying the Taximeter code to reflect current technology to suit the GPS based systems. NEWMA recommended that this item remain a Developing Item.

SWMA encourages the Taximeter Workgroup to continue to develop the GPS specifications and tolerances. SWMA recommended that this item remain as a Developing item.

Item: 3504-1
Summary of comments considered by the regional committee (in writing or during the open hearings):
The USNWG on taxi meters considers this item fully developed. The committee agrees and believes it is ready to be voted on.
Item as proposed by the regional committee: ***(If different than agenda item)***
Committee recommendation to the region: ☒ Voting Item on the NCWM Agenda ☐ Information Item on the NCWM Agenda ☐ Withdraw the Item from the NCWM Agenda (*In the case of new items, do not forward to NCWM)* ☐ Developing Item on the NCWM Agenda *(To be developed by source)*
Reasons for the committee recommendation:
The NEWMA S & T Committee supports the work group and would like to forward this item as Voting.
COMPLETE SECTION BELOW FOLLOWING VOTING SESSION
Final updated or revised proposal from the region: ***(If different than regional committee recommendation)***
Regional recommendation to NCWM for item status: ☒ Voting Item on the NCWM Agenda ☐ Information Item on the NCWM Agenda ☐ Withdraw the Item from the NCWM Agenda (*In the case of new items, do not forward to NCWM)* ☐ Developing Item on the NCWM Agenda *(To be developed by source)* ☐ Unable to consider at this time *(Provide explanation in the "Additional Comments" section below)*
Regional Report to NCWM: Please provide your report in this section exactly how you want it to appear in the NCWM reports to represent your region's considerations, support or opposition, and recommendations. **This will replace any previous reports from your region on this item.**
The NEWMA S & T Committee supports the workgroup and would like to forward this item as Voting.

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

3508 MULTIPLE DIMENSION MEASURING DEVICES

New-5 S.1.7. Minimum Measurement ~~Lengths~~ and S.1.8. Indications Below Minimum and Above Maximum

Source:
Multiple Dimension Measuring Device Work Group (2017)

Purpose:
Clarification of the application of the minimum measurement and tare operation.

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

S.1.7. Minimum Measurement ~~Lengths~~. – Except for entries of tare, the minimum **measurement** ~~length to be measured~~ by a device is 12 **d** ~~divisions~~. The manufacturer may specify a longer minimum **measurement** ~~length~~. **For multi-interval devices, this applies only to the first measuring segment.**

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** ~~Lengths~~ 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,** for the object being measured exceeds the measurement capability of the device, the indicating or recording element shall either:
…

Background/Discussion:
The MDMD Work Group believes that the expansion of S.1.7. to include multi-interval devices with the additional proposed changes provides a better explanation of how to apply the 12 d minimum measurement specification and the application of tare with respect to marked maximum dimension for the axes in which tare was applied.

This proposal also addresses the change in the use of the word "length" and recommends the use of the word "measurement". The Work Group feels that "measurement" is better suited for all axes.

These proposed changes better harmonize the device specifications with those of Measurement Canada

Item New-5
Summary of comments considered by the regional committee (in writing or during the open hearings):
There was concern that no one in the north east is testing these. Most of this testing is happening in Canada and the Mid-West. This item is ready to be voted on.
Item as proposed by the regional committee: ***(If different than agenda item)***
Committee recommendation to the region: ☒ Voting Item on the NCWM Agenda ☐ Information Item on the NCWM Agenda ☐ Withdraw the Item from the NCWM Agenda (*In the case of new items, do not forward to NCWM)* ☐ Developing Item on the NCWM Agenda *(To be developed by source)*
Reasons for the committee recommendation:
The NEWMA S & T committee supports this item to be voting.
COMPLETE SECTION BELOW FOLLOWING VOTING SESSION

Final updated or revised proposal from the region: ***(If different than regional committee recommendation)***
Regional recommendation to NCWM for item status: ☒ Voting Item on the NCWM Agenda ☐ Information Item on the NCWM Agenda ☐ Withdraw the Item from the NCWM Agenda (*In the case of new items, do not forward to NCWM)* ☐ Developing Item on the NCWM Agenda *(To be developed by source)* ☐ Unable to consider at this time *(Provide explanation in the "Additional Comments" section below)*
Regional Report to NCWM: Please provide your report in this section exactly how you want it to appear in the NCWM reports to represent your region's considerations, support or opposition, and recommendations. **This will replace any previous reports from your region on this item.**
The NEWMA S & T committee supports this item to be voting.

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

New-25 T.3. Tolerance Values (See also Items New-21, New-22, New-23, New-24, New-26 and New-27)

Source:
Ross Andersen, Retired (2017)

Purpose:
Provide language in this code that is consistent with the General Code.

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

> **T.3. Tolerance Values.** – **The tolerances hereinafter prescribed shall be applied equally to errors of underregistration and errors of overregistration**. The maintenance and acceptance tolerance values shall be ~~±~~1 division.

[Note the ±is stricken near the end of the second sentence.]

Background/Discussion:
The submitter provided the following comments:

> General Code paragraph **G-T.3. Application** explains that tolerances in the Handbook are expressed either in excess/in deficiency or, on overregistration/on underregistration. For the most part, one of these two formats is used in each code as applicable. Specifically, one of the Tolerance paragraphs in each Code has a specific statement along the lines of:
>
> The tolerances hereinafter prescribed shall be applied equally to errors of underregistration and errors of overregistration.
> or
> The tolerances hereinafter prescribed shall be applied equally to errors in excess and errors in deficiency.
>
> However, I was reviewing tolerances in a few codes and noticed that there were codes that were not consistent with these two formats. I am proposing the S&T Committee amend the code where necessary to

make all codes consistent with G-T.3. I have identified those codes in the table below. In all cases the tolerances are clearly meant to be or overregistration/underregistration in these codes, but the text in the code either has no specified format or just describes the tolerances as positive and negative.

2.20	Scales	Not specified & positive/negative
2.21	Belt-Conveyor	Not specified
2.24	AWS	positive/negative
2.25	Weigh-in-Motion	Not specified
5.58	MDMD	Not specified
5.59	Electronic Livestock, Meat, etc	Not specified

I note that describing tolerances as positive and negative is relative and can mean different things to different people. One person's plus can be another's minus. That is not a desirable situation. The use of "in excess," "in deficiency, "on overregistration," or "on underregistration" eliminate that ambiguity.

Note that our convention in the US is to express LMD errors as errors in delivery while most other codes we express errors in indication. G-T.3. is referring solely to errors in indication. For example, a dispenser test at 5 gal that is in error by -3 in^3 is overregistering. In contrast a scale test at 5 lb that is in error by -0.03 lb is underregistering. The distinction is most critical when the code does not apply tolerances equally to overregistration and underregistration.

It turns out the codes that do not specify the tolerance application format all apply the tolerances equally to overregistration/underregistration, so I believe these changes would be entirely editorial. I would further recommend that any "+/-" designation in the tolerance values or tables be eliminated as they are redundant and inconsistent with the principles in G-T.3.

In a related item, I believe it is necessary to bring the definition of overregistration/underregistration in line with modern measurement terminology. The definition now uses the expression "true value" in its examples. My understanding is that expression "true value" is highly discouraged mainly because no one knows what it really is. I am suggesting that we replace "true value" with "verified value" as indicated below. I opted for verified since we added the term verification to the HB44 definitions just a few years ago.

The proposed changes would make the Handbook treatment of tolerances consistent with G.T.3. It might be possible to make these changes editorially if the Committee agrees. However, because the deadline for proposals for the 2017 cycle nears, I am submitting this as a formal proposal.

Item New-25

Summary of comments considered by the regional committee (in writing or during the open hearings):

The NEWMA S & T Committee grouped Items 21, 22, 23, 24, 25, 26, 27 together and heard comments simultaneously to match these codes, scales code, belt conveyor code, automatic weighing systems, electronic livestock, meat and poultry evaluations systems with the general code G-T.3. Comment was heard that for lack of an adequate explanation, keep developing and allow the author a chance to explain and justify. The committee agreed and recommends as developing.

Item as proposed by the regional committee: ***(If different than agenda item)***

Committee recommendation to the region:

- ☐ Voting Item on the NCWM Agenda
- ☐ Information Item on the NCWM Agenda
- ☐ Withdraw the Item from the NCWM Agenda (*In the case of new items, do not forward to NCWM)*
- ☒ Developing Item on the NCWM Agenda *(To be developed by source)*

Reasons for the committee recommendation:
The NEWMA S & T Committee feels this proposal has merit with making language uniform but the interpretation when applying errors of overregistration and errors of underregistration; in excess/in deficiency could lead to confusion.
COMPLETE SECTION BELOW FOLLOWING VOTING SESSION
Final updated or revised proposal from the region: ***(If different than regional committee recommendation)***
Regional recommendation to NCWM for item status: ☐ Voting Item on the NCWM Agenda ☐ Information Item on the NCWM Agenda ☐ Withdraw the Item from the NCWM Agenda (*In the case of new items, do not forward to NCWM)* ☒ Developing Item on the NCWM Agenda *(To be developed by source)* ☐ Unable to consider at this time *(Provide explanation in the "Additional Comments" section below)*
Regional Report to NCWM: Please provide your report in this section exactly how you want it to appear in the NCWM reports to represent your region's considerations, support or opposition, and recommendations. **This will replace any previous reports from your region on this item.**
The NEWMA S & T Committee feels this proposal has merit with making language uniform but the interpretation when applying errors of overregistration and errors of underregistration; in excess/in deficiency could lead to confusion.

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

3509 ELECTRONIC LIVESTOCK, MEAT, AND POULTRY EVALUATION SYSTEMS

New-26 T.1. Tolerances on Individual Measurements (See related items New-21, New-22, New-23, New-24, New-25 and New-27)

Source:
Ross Andersen, Retired (2017)

Purpose:
Provide language in this code that is consistent with the General Code.

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

> **T.1. Tolerances on Individual Measurements.** – The tolerances hereinafter prescribed shall be applied equally to errors of underregistration and errors of overregistration. Maintenance and acceptance tolerance s on an individual measurement shall be as shown in Table T.1. Tolerances.

Background/Discussion:
The submitter provided the following comments:

General Code paragraph **G-T.3. Application** explains that tolerances in the Handbook are expressed either in excess/in deficiency or, on overregistration/on underregistration. For the most part, one of these two formats is used in each code as applicable. Specifically, one of the Tolerance paragraphs in each Code has a specific statement along the lines of:

The tolerances hereinafter prescribed shall be applied equally to errors of underregistration and errors of overregistration.
or
The tolerances hereinafter prescribed shall be applied equally to errors in excess and errors in deficiency.

However, I was reviewing tolerances in a few codes and noticed that there were codes that were not consistent with these two formats. I am proposing the S&T Committee amend the code where necessary to make all codes consistent with G-T.3. I have identified those codes in the table below. In all cases the tolerances are clearly meant to be or overregistration/underregistration in these codes, but the text in the code either has no specified format or just describes the tolerances as positive and negative.

2.20	Scales	Not specified & positive/negative
2.21	Belt-Conveyor	Not specified
2.24	AWS	positive/negative
2.25	Weigh-in-Motion	Not specified
5.58	MDMD	Not specified
5.59	Electronic Livestock, Meat, etc	Not specified

I note that describing tolerances as positive and negative is relative and can mean different things to different people. One person's plus can be another's minus. That is not a desirable situation. The use of "in excess," "in deficiency, "on overregistration," or "on underregistration" eliminate that ambiguity.

Note that our convention in the US is to express LMD errors as errors in delivery while most other codes we express errors in indication. G-T.3. is referring solely to errors in indication. For example, a dispenser test at 5 gal that is in error by -3 in^3 is overregistering. In contrast a scale test at 5 lb that is in error by -0.03 lb is underregistering. The distinction is most critical when the code does not apply tolerances equally to overregistration and underregistration.

It turns out the codes that do not specify the tolerance application format all apply the tolerances equally to overregistration/underregistration, so I believe these changes would be entirely editorial. I would further recommend that any "+/-" designation in the tolerance values or tables be eliminated as they are redundant and inconsistent with the principles in G-T.3.

In a related item, I believe it is necessary to bring the definition of overregistration/underregistration in line with modern measurement terminology. The definition now uses the expression "true value" in its examples. My understanding is that expression "true value" is highly discouraged mainly because no one knows what it really is. I am suggesting that we replace "true value" with "verified value" as indicated below. I opted for verified since we added the term verification to the HB44 definitions just a few years ago.

The proposed changes would make the Handbook treatment of tolerances consistent with G.T.3. It might be possible to make these changes editorially if the Committee agrees. However, because the deadline for proposals for the 2017 cycle nears, I am submitting this as a formal proposal.

Item New-26
Summary of comments considered by the regional committee (in writing or during the open hearings):
The NEWMA S & T Committee grouped Items 21, 22, 23, 24, 25, 26, 27 together and heard comments

simultaneously to match these codes, scales code, belt conveyor code, automatic weighing systems, electronic livestock, meat and poultry evaluations systems with the general code G-T.3. Comment was heard that for lack of an adequate explanation, keep developing and allow the author a chance to explain and justify. The committee agreed and recommends as developing.

Item as proposed by the regional committee: ***(If different than agenda item)***

Committee recommendation to the region:

- ☐ Voting Item on the NCWM Agenda
- ☐ Information Item on the NCWM Agenda
- ☐ Withdraw the Item from the NCWM Agenda (*In the case of new items, do not forward to NCWM)*
- ☒ Developing Item on the NCWM Agenda *(To be developed by source)*

Reasons for the committee recommendation:

The NEWMA S & T Committee feels this proposal has merit with making language uniform but the interpretation when applying errors of overregistration and errors of underregistration; in excess/in deficiency could lead to confusion.

COMPLETE SECTION BELOW FOLLOWING VOTING SESSION

Final updated or revised proposal from the region: ***(If different than regional committee recommendation)***

Regional recommendation to NCWM for item status:

- ☐ Voting Item on the NCWM Agenda
- ☐ Information Item on the NCWM Agenda
- ☐ Withdraw the Item from the NCWM Agenda (*In the case of new items, do not forward to NCWM)*
- ☒ Developing Item on the NCWM Agenda *(To be developed by source)*
- ☐ Unable to consider at this time *(Provide explanation in the "Additional Comments" section below)*

Regional Report to NCWM:

Please provide your report in this section exactly how you want it to appear in the NCWM reports to represent your region's considerations, support or opposition, and recommendations. **This will replace any previous reports from your region on this item.**

The NEWMA S & T Committee feels this proposal has merit with making language uniform but the interpretation when applying errors of overregistration and errors of underregistration; in excess/in deficiency could lead to confusion.

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

3600 OTHER ITEMS

3600-1 D Electric Watthour Meters Code under Development

Source:
NIST OWM (2016)

Purpose:

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

Item under Consideration:

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

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

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

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

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

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

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

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

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

Tina Butcher
Chairman to the NIST USNWG on Electric Vehicle Refueling and Submetering
301-975-2196
tbutcher@nist.gov

or

Juana Williams
Technical Advisor to the NIST USNWG on Electric Vehicle Refueling and Submetering
301-975-3989
Juana.williams@nist.go

Background/Discussion:
The creation of Developing Items on both the L&R and S&T Committee agendas will provide for a venue to allow the USNWG to update the weights and measures community on continued work to develop test procedures and test equipment standards. This item will also provide a forum for reporting on work to develop proposed method of sale requirements for electric watthour meters and a tentative device code for electric watthour meters in residential and business locations and serve as a placeholder for eventual submission of these proposals for consideration by NCWM.

2016 NCWM Interim Meeting:
At the 2016 NCWM Interim Meeting, the Committee received an update on the progress of this item from Mrs. Tina Butcher (OWM). Several officials voiced support for the continued development of the Electric Watthour Meters Code. In consideration of the comments received in support of the item, the Committee agreed to recommend the item continue in a "developing" status.

Regional Association Comments:
CWMA believed this item has merit and the comments received were in support, but that it is in need of development. CWMA recommended that it be a Developing item.

NEWMA and SWMA forwarded this item to NCWM, recommending it be a Developing item.

Item: 3600-1
Summary of comments considered by the regional committee (in writing or during the open hearings):
The title states this item is still under development. Comments were heard supporting this.
Item as proposed by the regional committee: ***(If different than agenda item)***
Committee recommendation to the region: ☐ Voting Item on the NCWM Agenda ☐ Information Item on the NCWM Agenda ☐ Withdraw the Item from the NCWM Agenda (*In the case of new items, do not forward to NCWM)* ☒ Developing Item on the NCWM Agenda *(To be developed by source)*
Reasons for the committee recommendation:
The NEWMA S & T Committee supports the continued development of this item.
COMPLETE SECTION BELOW FOLLOWING VOTING SESSION
Final updated or revised proposal from the region: ***(If different than regional committee recommendation)***
Regional recommendation to NCWM for item status: ☐ Voting Item on the NCWM Agenda ☐ Information Item on the NCWM Agenda ☐ Withdraw the Item from the NCWM Agenda (*In the case of new items, do not forward to NCWM)* ☒ Developing Item on the NCWM Agenda *(To be developed by source)* ☐ Unable to consider at this time *(Provide explanation in the "Additional Comments" section below)*
Regional Report to NCWM: Please provide your report in this section exactly how you want it to appear in the NCWM reports to represent your region's considerations, support or opposition, and recommendations. **This will replace any previous reports**

from your region on this item.
The NEWMA S & T Committee supports the continued development of this item.

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

New-2 Appendix A – Fundamental Considerations: Section 4.4. General Considerations (See related items New-1 and New-19)

Source:
Ross Andersen, Retired (2017)

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

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

4.**4. General Considerations.** –

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

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

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

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

4.**4. General Considerations.** – **Code requirements are applied only to a single device or system, unless specifically stated in the code. The official may encounter equipment where the digital indications from more than one device are electronically summed. This may be done in multiple ways. Each device may have its own indicating element and the sum is indicated on a separate, associated indicator which is**

interfaced directly with each device (i.e. a computer or console via cable or even bluetooth wireless communication). The indicating elements of the individual devices may be enclosed in a single housing, with separate indicators for each device and a separate indicator for the electronic sum. An electronic sum of measured values from multiple devices is not subject to code requirements, except that it be mathematically correct, i.e. add up to the proper sum - See General Code G-S.5.2.2.(e).

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

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

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

The submitter provided the following comments:

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

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

If we ask the question on our current issue, as Henry Oppermann has, it goes like this: How do we apply the Scales Code requirements to a three-platform scale with three independent weight indications and a fourth indication of the sum of the three independent platforms? His answer follows his logic of the “duck test.” Quoting him, “if a scale looks like truck scale, operates like a truck scale, and weights trucks, then it is a truck scale.”

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

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

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

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

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

A commodity exchanged in commerce may be measured:

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

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

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

the tank capacity of the single VTM. Alternatively, I could fill that order using drafts from multiple VTM units, option C.

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

to 1,200 as in Table 3. Other requirements like identification markings, rules for indicators, zero load adjustments, etc, remain applicable only to the individual wheel-load weigher and not to the pair.

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

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

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

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

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

3.1.2 Calculated weight (Meeting 10, Decision 10)

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

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

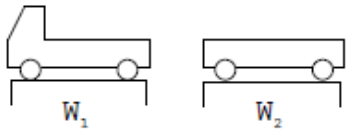
Any printout of the calculated weight values should be identified as calculated weight values.

(See also Sections 3.1.16 and 3.1.54)

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

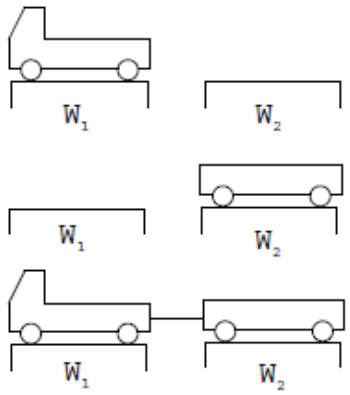
This concerns weight obtained by using adjacent weighbridges. Acceptable solutions, with examples, are shown below:

Two weighbridges, each with its own indicator:



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

Multi-plate weighbridge with one indicator:



W_1 = 30 t x 10 kg

W_2 = 30 t x 10 kg

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

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

(See also Sections 3.1.2 and 3.1.54)

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

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

(See also Sections 3.1.2 and 3.1.6)

3.1.6 Load cells

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

Item New-2
Summary of comments considered by the regional committee (in writing or during the open hearings):
The committee grouped Items 1, 2 and 19 together and heard comments simultaneously. Some comments were heard clarifying the purpose of the item. Other comments were heard recommending the item be developing.
Item as proposed by the regional committee: ***(If different than agenda item)***

Committee recommendation to the region: ☐ Voting Item on the NCWM Agenda ☐ Information Item on the NCWM Agenda ☐ Withdraw the Item from the NCWM Agenda (*In the case of new items, do not forward to NCWM)* ☒ Developing Item on the NCWM Agenda *(To be developed by source)*
Reasons for the committee recommendation:
The NEWMA S & T Committee feels this item has merit; however, the committee would like an example of how this applies to independent/multiple devices.
COMPLETE SECTION BELOW FOLLOWING VOTING SESSION
Final updated or revised proposal from the region: ***(If different than regional committee recommendation)***
Regional recommendation to NCWM for item status: ☐ Voting Item on the NCWM Agenda ☐ Information Item on the NCWM Agenda ☐ Withdraw the Item from the NCWM Agenda (*In the case of new items, do not forward to NCWM)* ☒ Developing Item on the NCWM Agenda *(To be developed by source)* ☐ Unable to consider at this time *(Provide explanation in the "Additional Comments" section below)*
Regional Report to NCWM: Please provide your report in this section exactly how you want it to appear in the NCWM reports to represent your region's considerations, support or opposition, and recommendations. **This will replace any previous reports from your region on this item.**
The NEWMA S & T Committee feels this item has merit; however, the committee would like an example of how this applies to independent/multiple devices.

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

3600-2 Appendix D – Definitions: Batching System

Source:
Richard Suiter Consulting (2016)

Purpose:
Add a definition to NIST Handbook 44 Appendix D to differentiate batching systems from other types of weighing and measuring systems.

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

> **batching system. – One in which materials are measured in pre-determined quantities by weight and/or liquid measure. 2.20**

Background/Discussion:
At the 2016 Annual Meeting, the Committee changed the status of this item from Voting to Informational at the request of the submitter.

Even though there are numerous batching systems in the market place and several batching systems, manual and automated, have an NTEP COC there is no definition in Handbook 44 to differentiate these systems from other types of weighing and measuring systems. Weights and Measures officials seeing a system for the first time, particularly if automated, may have difficulty in determining what section of the Scales Code to apply. This definition will assist those officials in making that determination. The SMA Handbook of Terms and Definitions Fourth Edition 1981 includes a definition for batching systems; however, for some reason that definition has never been added to Handbook 44. The definition for batching scales also has never been added even though Paragraph S.1.2. Value of Scale Division Units, makes an exception for "batching scales and weighing systems."

2016 NCWM Interim Meeting

At the 2016 NCWM Interim Meeting, the Committee agreed to group Item 320-1 and 360-3 together and receive comments simultaneously on these two items. See Item 320-1 for a summary of the comments received and Committee considerations regarding these two items.

The Committee agreed to amend the proposed definition of "batching system" by deleting the word "raw" as was done by the WWMA S&T Committee at its 2015 Annual Meeting and also proposed by the SMA. The Committee further agreed to present the item for vote as shown in Item Under Consideration at the Annual Meeting.

Regional Association Comments:

WWMA S&T Committee decided to strike the word "raw" from the proposal due to concerns that it might be viewed as unnecessarily restrictive. No opposition to this action was voiced during the voting session. WWMA forwarded the item to NCWM with the recommendation that it be a Voting item as amended below:

> **batching system. –** One in which ~~**raw**~~ materials are measured in pre-determined quantities by weight and/or liquid measure. 2.20

CWMA supported the submitter's request to forward this as an Informational item.

NEWMA could not recommend this item as voting with the need for clarification. The related item in the Scales Code was withdrawn and it was suggested that there is no benefit to adding a definition unless that item was adopted. NEWMA recommended that it be an Information Item to see how it can be defined.

Item: 3600-1
Summary of comments considered by the regional committee (in writing or during the open hearings):
The committee grouped this item with New 7. Dick Suiter could not be here, wrote an email asking for support on these items. There was a question wondering if there was a HB44 definition for batching systems. 3600-2 is the proposal definition for batching systems. No opposition to be moved as a voting item.
Item as proposed by the regional committee: ***(If different than agenda item)***
Committee recommendation to the region: ☒ Voting Item on the NCWM Agenda ☐ Information Item on the NCWM Agenda ☐ Withdraw the Item from the NCWM Agenda (*In the case of new items, do not forward to NCWM)* ☐ Developing Item on the NCWM Agenda *(To be developed by source)*
Reasons for the committee recommendation:
Mr. Suiter was asked by the NCWM S & T committee to clarify the language for the scales code, the NEWMA S & T Committee feels the language is pertinent to defining a batching scale.
COMPLETE SECTION BELOW FOLLOWING VOTING SESSION
Final updated or revised proposal from the region: ***(If different than regional committee recommendation)***

Regional recommendation to NCWM for item status:

- ☒ Voting Item on the NCWM Agenda
- ☐ Information Item on the NCWM Agenda
- ☐ Withdraw the Item from the NCWM Agenda (*In the case of new items, do not forward to NCWM)*
- ☐ Developing Item on the NCWM Agenda *(To be developed by source)*
- ☐ Unable to consider at this time *(Provide explanation in the "Additional Comments" section below)*

Regional Report to NCWM:

Please provide your report in this section exactly how you want it to appear in the NCWM reports to represent your region's considerations, support or opposition, and recommendations. **This will replace any previous reports from your region on this item.**

Mr. Suiter was asked by the NCWM S & T committee to clarify the language for the scales code, the NEWMA S & T Committee feels the language is pertinent to defining a batching scale.

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

New-27 Appendix D – Definitions: overregistration and underregistration (See related items New-21, New-22, New-23, New-24, New-25 and New-26)

Source:
Ross Andersen, Retired (2017)

Purpose:
Provide language that is consistent with the General Code.

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

> **overregistration and underregistration.–** When an instrument or device is of such a character that it indicates or records values as a result of its operation, its error is said to be in the direction of overregistration or underregistration, depending upon whether the indications are, respectively, greater or less than they should be. Examples of devices having errors of "overregistration" are: a fabric-measuring device that indicates more than the **verified** ~~**true**~~ length of material passed through it; and a liquid-measuring device that indicates more than the **verified** ~~**true**~~ amount of the liquid delivered by the device. Examples of devices having errors of "underregistration" are: a meter that indicates less than the **verified** ~~**true**~~ amount of product that it delivers; and a weighing scale that indicates or records less than the **verified** ~~**true**~~ weight of the applied load. [1.10]

Background/Discussion:
The submitter provided the following comments:

> General Code paragraph **G-T.3. Application** explains that tolerances in the Handbook are expressed either in excess/in deficiency or, on overregistration/on underregistration. For the most part, one of these two formats is used in each code as applicable. Specifically, one of the Tolerance paragraphs in each Code has a specific statement along the lines of:
>
> The tolerances hereinafter prescribed shall be applied equally to errors of underregistration and errors of overregistration.
> or
> The tolerances hereinafter prescribed shall be applied equally to errors in excess and errors in deficiency.

However, I was reviewing tolerances in a few codes and noticed that there were codes that were not consistent with these two formats. I am proposing the S&T Committee amend the code where necessary to make all codes consistent with G-T.3. I have identified those codes in the table below. In all cases the tolerances are clearly meant to be or overregistration/underregistration in these codes, but the text in the code either has no specified format or just describes the tolerances as positive and negative.

2.20	Scales	Not specified & positive/negative
2.21	Belt-Conveyor	Not specified
2.24	AWS	positive/negative
2.25	Weigh-in-Motion	Not specified
5.58	MDMD	Not specified
5.59	Electronic Livestock, Meat, etc	Not specified

I note that describing tolerances as positive and negative is relative and can mean different things to different people. One person's plus can be another's minus. That is not a desirable situation. The use of "in excess," "in deficiency, "on overregistration," or "on underregistration" eliminate that ambiguity.

Note that our convention in the US is to express LMD errors as errors in delivery while most other codes we express errors in indication. G-T.3. is referring solely to errors in indication. For example, a dispenser test at 5 gal that is in error by -3 in^3 is overregistering. In contrast a scale test at 5 lb that is in error by -0.03 lb is underregistering. The distinction is most critical when the code does not apply tolerances equally to overregistration and underregistration.

It turns out the codes that do not specify the tolerance application format all apply the tolerances equally to overregistration/underregistration, so I believe these changes would be entirely editorial. I would further recommend that any "+/-" designation in the tolerance values or tables be eliminated as they are redundant and inconsistent with the principles in G-T.3.

In a related item, I believe it is necessary to bring the definition of overregistration/underregistration in line with modern measurement terminology. The definition now uses the expression "true value" in its examples. My understanding is that expression "true value" is highly discouraged mainly because no one knows what it really is. I am suggesting that we replace "true value" with "verified value" as indicated below. I opted for verified since we added the term verification to the HB44 definitions just a few years ago.

The proposed changes would make the Handbook treatment of tolerances consistent with G.T.3. It might be possible to make these changes editorially if the Committee agrees. However, because the deadline for proposals for the 2017 cycle nears, I am submitting this as a formal proposal.

Item New-27
Summary of comments considered by the regional committee (in writing or during the open hearings):
The NEWMA S & T Committee grouped Items 21, 22, 23, 24, 25, 26, 27 together and heard comments simultaneously to match these codes, scales code, belt conveyor code, automatic weighing systems, electronic livestock, meat and poultry evaluations systems with the general code G-T.3. Comment was heard that for lack of an adequate explanation, keep developing and allow the author a chance to explain and justify. The committee agreed and recommends as developing.
Item as proposed by the regional committee: ***(If different than agenda item)***
Committee recommendation to the region: ☐ Voting Item on the NCWM Agenda ☐ Information Item on the NCWM Agenda

☐ Withdraw the Item from the NCWM Agenda (*In the case of new items, do not forward to NCWM)* ☒ Developing Item on the NCWM Agenda *(To be developed by source)*
Reasons for the committee recommendation:
The NEWMA S & T Committee feels this proposal has merit with making language uniform but the interpretation when applying errors of overregistration and errors of underregistration; in excess/in deficiency could lead to confusion.
COMPLETE SECTION BELOW FOLLOWING VOTING SESSION
Final updated or revised proposal from the region: *(If different than regional committee recommendation)*
Regional recommendation to NCWM for item status: ☐ Voting Item on the NCWM Agenda ☐ Information Item on the NCWM Agenda ☐ Withdraw the Item from the NCWM Agenda (*In the case of new items, do not forward to NCWM)* ☒ Developing Item on the NCWM Agenda *(To be developed by source)* ☐ Unable to consider at this time *(Provide explanation in the "Additional Comments" section below)*
Regional Report to NCWM: Please provide your report in this section exactly how you want it to appear in the NCWM reports to represent your region's considerations, support or opposition, and recommendations. **This will replace any previous reports from your region on this item.**
The NEWMA S & T Committee feels this proposal has merit with making language uniform but the interpretation when applying errors of overregistration and errors of underregistration; in excess/in deficiency could lead to confusion.

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

3600-3 D Appendix D – Definitions: Remote Configuration Capability

Source:
NIST office of Weights and Measures (2013)

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

Item Under Consideration:
This item is under development. Comments and inquiries may be directed to NIST Office of Weights and Measures.

A proposal to modify the definition for "remote configuration capability" as follows is under consideration:

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

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

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Background / Discussion:
Removable digital storage devices can be used in GMMs as either data transfer devices that are not necessary to the operation of the GMM or as data storage devices which are necessary to the operation of the GMM. If removable data storage devices are necessary to the operation of the device, they are not covered by the current definition of remote configuration capability.

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

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

Note: In the above example SD memory card could be any removable flash memory card such as the Secure Digital Standard-Capacity, the Secure Digital High-Capacity, the Secure Digital Extended-Capacity, and the Secure Digital Input/Output, which combines input/output functions with data storage. These come in three form factors: the original size, the mini size, and the micro size. A Memory Stick is a removable flash memory card format, launched by Sony in 1998, and is also used in general to describe the whole family of Memory Sticks. In addition to the original Memory Stick, this family includes the Memory Stick PRO, the Memory Stick Duo, the Memory Stick PRO Duo, the Memory Stick Micro, and the Memory Stick PRO-HG.

At its 2011 Grain Analyzer Sector Meeting the Sector agreed by consensus that the following changes to Table S.2.5. of §5.56.(a) of NIST Handbook 44 should be forwarded to the S&T Committee for consideration:

- Add a note to Table S.2.5. to recognize the expanded scope of remote capability.
- Delete "remotely" from the second paragraph of Category 3 requirements that begins, "When accessed remotely …" to make it clear that the requirements of Category 3 apply whether accessed manually using the keyboard or accessed by remote means.
- Add the modified second paragraph of Category 3 requirements to Categories 3a and 3b to make it clear that these requirements apply to all the subcategories of Category 3.

Because a change to the definition of remote configuration capability will apply to other device types, NIST OWM recommended that the changes to Table S.2.5. approved by the Sector in 2011 be separated into two independent proposals. One proposal would deal with the changes to Category 3 and its subcategories. The second would

recommend a modification of the definition of "remote configuration capability" appearing in Appendix D of NIST Handbook 44 to recognize the expanded scope of remote capability; this proposal would be an alternative to adding a note to the bottom of Table S.2.5. to expand the definition for remote configuration for grain moisture meters (as shown in this proposal).

At its 2012 Meeting, the Grain Analyzer Sector agreed to separate its original proposal into two separate proposals and agreed to forward this proposal to change the definition of "remote configuration capability" to the S&T to Committee for consideration. See also August 2012 NTEP Grain Analyzer Sector Summary, Item 5.

See the Committee's 2013 and 2014 Final Reports for additional background information and to review the different proposals considered by the Committee to address security of equipment; the metrological parameters of which can be changed by use of some form of removable digital storage device.

2015 NCWM Interim Meeting
At the 2015 NCWM Interim Meeting S&T open hearings, Mrs. Tina Butcher (OWM) requested that the Committee reassign this item to OWM noting that the issue identified by the Grain Analyzer Sector had not been resolved. Mrs. Butcher noted that a gap still exists concerning the sealing of equipment in which the sealable parameters of that equipment can be changed by use of a removable digital storage device. She stated that members of OWM's Legal Metrology Devices Program (LMDP) have agreed to take up this issue after the 2015 Interim Meeting in hopes of being able to develop a proposal that addresses the issue and be able to report on its progress at the next NCWM Conference.

Mr. Michael Keilty (Endress + Hauser Flowtec AG USA) stated he too would be willing to work with OWM on a proposal to address this issue.

The SMA commented that it looks forward to further clarification of this item.

The Committee agreed to reassign this item to OWM for additional development based on OWM's assessment there remains an unresolved issue involving the sealing of equipment using removable digital storage devices.

2015 NCWM Annual Meeting
At the 2015 NCWM Annual Meeting, Mrs. Tina Butcher (OWM) provided an update to the Committee on OWM's progress in developing this item. Mrs. Butcher noted that OWM's Legal Metrology Devices Program (LMDP) had met several times since the 2015 Interim Meeting to work on this issue. Rather than attempting to modify current sealing requirements, which never envisioned this method of adjustment, the LMDP propose creating a separate set of sealing requirements for this technology. Members of the LMDP developed a draft General Code paragraph they believe will address the sealing of devices using this technology to make adjustments. The LMDP requests the following draft General Code paragraph be included in this item to begin generating feedback to assist in further development of this item:

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

Mrs. Butcher also noted that OWM plans to propose modifications to a number of the individual device codes in HB 44 to reference the new General Code sealing requirement. The following draft example requirement was developed by the LMDP and included in OWM's written analysis of this item, to provide an indication of how some of the device codes in HB 44 will need to be amended that this type of sealing can be addressed:

Proposed changes to Scales Code Paragraph S.1.11. Provision for Sealing:

S.1.11. Provision for Sealing.

S.1.11.1 Devices Adjusted Using a Removable Digital Storage Device. - For those devices adjusted using a removable digital storage device, G-S.8.2. applies.

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

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

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

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

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

As final comment regarding this item, Mrs. Butcher indicated that devices using other means to access adjustments would continue to be addressed by current sealing requirements.

2016 NCWM Interim Meeting
At the Committee's 2016 NCWM Interim Meeting open hearings, Mrs. Tina Butcher (OWM) provided the following update on this item:

- Work on this item by members of OWM's Legal Metrology Devices Program (LMDP) is ongoing.
- The LMDP has not done further work on this item since the 2015 NCWM Annual Meeting, but anticipates resuming work in the spring of 2016.
- The LMDP has received feedback from the Measuring Sector and Regional Associations, which it will consider when developing any new revisions to the proposal.

- The LMDP hopes to be able to complete additional draft revisions and circulate them for consideration and feedback by the W&M Community by the 2016 NCWM Annual Meeting.
- As noted at the 2015 NCWM Annual Meeting, the LMDP plans to propose a new General Code requirement to address the sealing of equipment using this technology; this would allow the same "sealing requirement" to be applied to all the different device types that might use this technology.
- Some of the device codes in HB 44 would need to be amended to exempt equipment adjusted using a removable digital storage device from having to comply with the current sealing requirements in those codes and to reference the proposed new General Code requirement.
- Although still in early draft form, members of the LMDP presented draft revisions for the General Code requirement and an example of a proposed change to the Scales Code at the 2015 NCWM Annual Meeting and would appreciate feedback from the W&M community as it continues to develop this item.

Mr. Russ Vires (Mettler-Toledo, LLC), speaking on behalf of the SMA reported that the SMA looks forward to the further clarification of this item. The SMA has concerns about changing metrological parameters without proper re-sealing.

The Committee believes this item has merit and needs further development. It looks forward to being able to consider a final proposal that addresses security of equipment using this type of technology.

Regional Association Comments:
WWMA received comment from Ms. Tina Butcher, NIST OWM, that work will continue on this item and proposed developing separate sealing requirements for other devices which are adjusted using removable media. She recommended that this item be reassigned to NIST and retain a developing status. The WWMA S&T Committee agrees with this request. WWMA recommended that the item be a Developing item.

CWMA believes this item has merit and the comments received were in support of it but recommended that it be a Developing item.

NEWMA recommended that this be a Developing item as a way of OWM ensuring the changes are accountable.

SWMA reported its understanding that NIST OWM will take over the development of this item.

Item: 3600-3
Summary of comments considered by the regional committee (in writing or during the open hearings):
It was proposed that this item be left as developing as it was still being worked on. Comments supported this proposal.
Item as proposed by the regional committee: ***(If different than agenda item)***
Committee recommendation to the region: ☐ Voting Item on the NCWM Agenda ☐ Information Item on the NCWM Agenda ☐ Withdraw the Item from the NCWM Agenda (*In the case of new items, do not forward to NCWM)* ☒ Developing Item on the NCWM Agenda *(To be developed by source)*
Reasons for the committee recommendation:
The NEWMA S & T Committee supports the work of NIST and the further development of this item.
COMPLETE SECTION BELOW FOLLOWING VOTING SESSION
Final updated or revised proposal from the region: ***(If different than regional committee recommendation)***
Regional recommendation to NCWM for item status: ☐ Voting Item on the NCWM Agenda ☐ Information Item on the NCWM Agenda ☐ Withdraw the Item from the NCWM Agenda (*In the case of new items, do not forward to NCWM)* ☒ Developing Item on the NCWM Agenda *(To be developed by source)* ☐ Unable to consider at this time *(Provide explanation in the "Additional Comments" section below)*
Regional Report to NCWM: Please provide your report in this section exactly how you want it to appear in the NCWM reports to represent your region's considerations, support or opposition, and recommendations. **This will replace any previous reports from your region on this item.**
The NEWMA S & T Committee supports the work of NIST and the further development of this item.

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

New 11 5.XX. Transportation Network Measurement Systems – Tentative Code and Appendix D Definitions (See related item New-12)

Source:
USNWG on Taximeters (2017)

Purpose:
Add a new tentative code for transportation-for-hire measurement systems being referred to as "Transportation Network Measurement Systems" to NIST Handbook 44.

Item Under Consideration:
Amend NIST Handbook 44 by adding a new code and definitions to Appendix D as follows:

5.XX. Transportation Network Measurement Systems – Tentative Code

This tentative code has only a trial or experimental status and is not intended to be enforced. The requirements are designed for study prior to the development and adoption of a final code. Officials wanting to conduct an official examination of a device or system are advised to see paragraph G-A.3. Special and Unclassified Equipment.

(Tentative Code Added 20XX)

A. Application

A.1. General. – This code applies to a transportation network measurement system used in connection with a digital network that determines the actual time elapsed and/or distance travelled during a network-arranged ride to calculate a fare for transportation services.

Note: The fare is calculated by software services residing on the transportation network company servers using data transmitted by the indicating elements present in the vehicle, which are running software applications or services supplied by the transportation network company. The measurement data is generated from sources not physically connected to the vehicle, e.g., a navigation satellite system such as GPS and/or other location services.

A.2. Exceptions. – This code does not apply to:

(a) any system that charges a flat rate or fixed charge, and/or does not use a measurement of actual time elapsed or distance travelled to calculate a fare for transportation services;

(b) odometers on vehicles that are rented or hired on a distance basis (for which see Section 5.53. Odometers);

(c) taximeters (for which see Section 5.54. Taximeters); or

(d) any system where the fare is calculated by equipment located in the vehicle.

A.3. Additional Code Requirements. – In addition to the requirements of this code, transportation network measurement systems shall meet the requirements of Section 1.10. General Code.

S. Specifications

S.1. Design of Indicating and Recording Elements. - Indicating and recording elements shall provide indications and recorded representations that are clear, definite, accurate, and easily read under any conditions of normal operation of the device(s).

All indicating and recording elements used in a transportation network measurement system shall operate correctly while using the online-enabled technology application service provided by the transportation network company.

S.1.1. General Indicating Elements. – A transportation network measurement system shall include, as a minimum:

(a) an indicating element used by a transportation network company driver that displays information and facilitates the measurements during a network-arranged ride to calculate a fare for transportation services; and

(b) an indicating element used by a transportation network company rider that displays information that allows the rider to review the current rate(s) for the transportation service and request a ride.

S.1.2. General Recording Elements. – A transportation network measurement system shall be capable of:

(a) recording all information necessary to generate a receipt specified in S.1.10. Receipt; and

(b) providing information to transportation network company drivers, including but not limited to a summary of rides given as specified in S.1.11. Driver's Summary; and

(c) providing a copy of all metrological data required by law to be provided to a weights and measures jurisdiction with statutory authority.

S.1.3. Identification. – All transportation network measurement system indicating elements shall display for the purposes of identification the following information:

(a) the name, initials, or trademark of the transportation network measurement system manufacturer, distributor, or developer; and

(b) the current version or revision identifier of the software application service provided by the transportation network company running on the indicating elements identified in S.1.1. General Indicating Elements.

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

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

S.1.4. Location of Identification Information. – The information required by S.1.3. Identification shall be accessible through an easily recognized menu and, if necessary, a submenu or other appropriate means. Examples of menu and submenu identification include, but are not limited to, "Help," "About," "System Identification," "Weights and Measures Identification," or "Identification."

S.1.5. Display of Rates and Additional Charges. – The transportation network measurement system shall be designed to make available to transportation network company riders the rate(s) for transportation services before the beginning of a network-arranged ride. The system shall also be capable of providing an explanation of the basis for calculating a fare including, if applicable, the base fare, rates for time and distance, and the amount of a booking fee, platform fee, or other similar service fee, before a rider submits the request for a network-arranged ride.

S.1.6. Fare Estimates. The transportation network measurement system shall be capable of displaying a fare estimate to the transportation network company rider before a request for a network-arranged ride is made.

S.1.7. Actuation of Measurement System. – Following the initiation of a network-arranged ride by the transportation network company driver, and prior to the conclusion of that network-arranged ride, the transportation network measurement system shall only indicate and/or record measurements resulting from the movement of the vehicle or by the time mechanism.

S.1.8. Fare Adjustment. – A transportation network measurement system shall be designed with:

(a) a "time off" mechanism and a "distance off" mechanism provided for the transportation network system driver to render the measurement of time and distance either operative or inoperative during the ride; or

(b) the capability to make post-transaction fare adjustments to reduce the amount of the fare, provided that the system creates a record of all location and time data from the time the ride request was accepted by the transportation network company driver.

[Nonretroactive as of January 1, 20XX]

S.1.9. Fare Identification and Other Charges.

S.1.9.1. Fare Identification. – Fare indications shall be identified by the word "Fare" or by an equivalent expression when displayed on the transportation network company system receipt required by S.1.10. Values shall be defined by suitable words or monetary signs.

S.1.9.2. Other Charges. – Other charges shall be indicated as separate line items when displayed on the receipt required by S.1.10. Receipt. Other charges shall be identified using an appropriate descriptive term, including but not limited to "Booking Fee," "Tolls," "Airport Pickup/Dropoff Surcharge" or an equivalent expression. Values shall be defined by suitable words or monetary signs.

S.1.10. Receipt. – A transportation network measurement system shall issue a printed or electronic receipt to a transportation network company rider. This receipt shall include as a minimum the following:

(a) date of the start of the trip;

(b) unique identifying information sufficient for the transportation network company to identify the transaction, or other identifying information as specified by the statutory authority;

(c) start and end time of trip, total time of trip (maximum increment of one second), and if applicable, the total elapsed time during any time-off period;

(d) distance traveled, maximum increment of 0.01 kilometer or 0.01 mile;

(e) the associated fare in $;

(f) other charges where permitted shall be identified and itemized;

(g) total charge in $;

(h) the start and end addresses or locations of the trip;

(i) a map showing the route taken; and

(j) a means to obtain transportation network company rider assistance.

S.1.11. Driver's Summary. – A transportation network measurement system shall be capable of providing a summary of the driver's activity regarding network-arranged rides. The summary shall include, but not be limited to, the following information about each ride:

(a) date and time for start of trip;

(b) unique identifying information sufficient for the transportation network company to identify the transaction, or other identifying information as specified by the statutory authority;

(c) total time of trip, maximum increment of one second;

(d) distance traveled, maximum increment of 0.01 kilometer or 0.01 mile;

(e) the total fare received;

(f) other charges where permitted; and

(g) a means to obtain transportation network company driver assistance.

S.2. Provision for Sealing.

S.2.1. System Security. – Adequate provision shall be made to provide security for a transportation network measurement system. The system shall be designed to:

(a) protect the integrity of metrological data and algorithms used to compute fares from such data against unauthorized modification using industry-standard technological protection mechanisms such as data encryption; and

(b) use software-based access controls or equivalent technological protections that limit access to metrological data and algorithms used to compute fares from such data only to authorized persons.

S.2.2. System Audit. – The transportation network measurement system shall be designed in a manner that permits officials having statutory authority to verify compliance with this transportation network measurement system code.

S.2.3. Change Tracking. – Changes made by the manufacturer, distributor, or developer of a transportation network measurement system to any algorithms or code which have a metrological effect shall be logged and recorded. The period covered by this change record is not required to exceed one year.

S.3. Provision for Trip Data Loss. – In the event that a portion of the trip data is lost due to power or signal interruption by the transportation network company driver's indicating element, the transportation network measurement system shall be capable of determining the information needed to complete any transaction in progress at the time of the power or signal loss.

S.3.1. Intermittent Trip Data Loss. – When the location services signal is lost intermittently during a prearranged ride (e.g., traveling through a tunnel) but recovered prior to the end of the ride, the transportation network measurement system shall be capable of calculating an accurate fare in accordance with T.1. Tolerance Values.

S.3.2. Significant Trip Data Loss. – When the location services signal is lost for a significant portion of the network-arranged ride, the transportation network measurement system shall provide for alternative fare structures.

Note: Significant trip data loss refers to instances when the location services signal is lost to the extent that the transportation network measurement system is not capable of calculating an accurate fare in accordance with T.1. Tolerance Values using actual time and actual distance, or when the signal is not regained by the end of the ride.

S.3.3. Alternative Fare Structures. – In the event the transportation network measuring system is not using actual time and actual distance for a particular trip (e.g., zone-based fares, signal loss), that portion of the fare not based on actual time and actual distance is not subject to this code. Charges not based on actual time and actual distance measurements may be based on the terms of service.

N. Notes

N.1. Distance Tests.

N.1.1. Test Methods. – To determine compliance with distance tolerances, distance test(s) of a transportation network measurement system shall be conducted. The distance test(s) shall consist of a road test unless safety or other practical concerns prohibit road testing. A transfer standard test may be performed in the absence of a road test. At least one test shall be of a length sufficient to exceed the minimum fare.

N.1.1.1. Road Test. – The test consists of operating the conveyance over a precisely measured course calibrated to a traceable linear measure of at least one mile in length

N.1.1.2. Transfer Standard Test. – The test consists of operating the conveyance over an unmeasured course while using a calibrated transfer standard, such as a fifth-wheel, to measure the distance travelled.

Note: Field examinations of transportation network measurement systems need not include testing of all individual devices that are used as driver/passenger indicating elements in connection with the service provided. It is considered sufficient that a representative sample of various indicating elements be incorporated in testing to verify proper operation of the system.

N.1.2. Test Procedures.

N.1.2.1. Test Length. – All tests must be at least one mile in length. If a measured course or testing equipment is not readily available that will enable a test of a length sufficient to exceed the minimum fare, after completing the testing specified in N.1.1. Test Methods, an additional unmeasured test may be conducted. The purpose of this additional unmeasured test is to verify compliance with S.1.10. Receipt.

N.1.2.2. Additional Tests. – If during testing a transportation network measurement system produces a measurement that does not comply with the tolerance values in T.1.1. Distance Tests, a minimum of three additional tests shall be conducted at the same location where all test variables are reduced to the greatest extent practicable to verify the system's ability to repeat transaction indications. Repeatability testing performed in excess of these three additional tests is done at the discretion of the official with statutory authority.

To verify system-wide noncompliance, tests for variability shall be conducted, including a minimum of three consecutive tests of varying lengths, locations, and/or environmental conditions.

N.1.3. Test Conditions.

N.1.3.1. General. – Except during type evaluation, all tests shall be performed under the conditions that are considered usual and customary within the location(s) where the system is normally operated as deemed necessary by the statutory authority.

N.1.3.2. Roads. – All tests shall be conducted on public roads which are in good repair.

N.1.3.3. Testing for Environmental Influences. – During type evaluation, the distance test may include a route traveled by the vehicle that will expose the system to conditions that could contribute to the loss of, or interference with the location service's signal. This may include:

a) Objects that may obstruct or reflect signals such as tall buildings/structures, forestation, tunnels, etc.;

b) Routes that do not follow a straight-line path;

c) Significant changes in altitude;

d) Any other relevant environmental conditions

N.2. Time Test. – A transportation network measurement system which determines time elapsed shall be tested for compliance with the tolerances values specified in T.1.2. Time Tests, using a certified, traceable standard.

T. Tolerances

T.1. Tolerance Values. – The tolerances will be as specified in T.1.1. Distance Tests and T.1.2. Time Tests. (The following proposed tolerance values will be confirmed based on performance data evaluated by the U.S. National Work Group before the transportation network measurement systems code becomes a Permanent Code).

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

(a) On Overregistration: 2.5%

(b) On Underregistration: 2.5%

T.1.2. Time Tests. – Maintenance and acceptance tolerances shall be as follows:

(a) On Overregistration: 5 seconds or 0.5%, whichever is greater

(b) On Underregistration: 5 seconds or 0.5%, whichever is greater

T.2. 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.

UR. User Requirements

UR.1. System Indications. – The indicating elements identified in S.1.1. General Indicating Elements shall display indications and information in a manner such that they can be conveniently read by the user of the device, computer, website, or online-enabled technology application service.

UR.1.1. Statement of Rates. – The transportation network company rider shall be able to view the basis for calculating the fare including, if applicable, the base fare, rates for time and distance, and the amount of a booking fee, platform fee, or other similar service fee.

UR.2. Change Tracking. – Upon request by an official having statutory authority, the transportation network company shall provide an explanation of changes that are logged pursuant to S.2.3. Change Tracking requirement during the time period covered by the request. Any such request shall be answered within two business days, unless extended by the official having statutory authority. Records provided pursuant to S.2.3. Change Tracking shall be treated as confidential and proprietary to the extent permitted by any applicable law.

UR.3. System Installation and Operation. – The transportation network company driver shall use the indicating elements identified in S.1.1. (a) General Indicating Elements in accordance with the requirements of the manufacturer, distributor, or developer.

UR.4. Fare Estimates. – Estimates for fare charges shall be provided by the transportation network measurement system when requested by the transportation network company rider and following the input of a final destination for the trip being requested. The recipient of the fare estimate shall be able to access information about the fare estimate, including key variables that may lead to discrepancies between actual fare charged and the fare estimate provided as required by law.

UR.5. Determination of Total Charges When Location Service Data is Lost. – The transportation network company shall disclose the manner in which total charges are determined when there is significant data loss from location services to the transportation network company rider and driver after the conclusion of the trip.

Appendix D

digital network. – An online-enabled technology application service, website, or system offered or used by a transportation network company that enables a transportation network company rider to arrange a network-arranged ride with a transportation network company driver. [5.XX]

network-arranged ride. **–** The provision of transportation by a transportation network company driver to a transportation network company rider, or other persons selected by the transportation network company rider, arranged through a digital network. [5.XX]

transportation network measurement system. – The information technology infrastructure and services offered or used by a transportation network company that receives data collected through a digital network and calculates a fare for a network-arranged ride.

transportation network company. – An entity that uses a digital network to connect transportation network company riders with transportation network company drivers who provide network-arranged rides, and offers or provides a transportation network measurement system, subject to an agreement or terms of service between the transportation network company and transportation network company rider or driver. [5.XX]

transportation network company driver. – An individual authorized by the transportation network company to access the digital network and receive connections to transportation network company riders for the purpose of providing network-arranged rides. [5.XX]

transportation network company rider. – An individual who has obtained an account with a transportation network company and uses the transportation network company's digital network to connect with a transportation network company driver who can offer or provide a network-arranged ride to the transportation network company rider or other persons selected by the transportation network company rider. [5.XX]

transfer standard. – A device or standard used in the field to evaluate the device or system under test.

Background/Discussion

Proposed change (1):

The appearance of new types of transportation-for-hire services that use location services (such as GPS) and software applications as an interface for the user and provider of the service has created a need for regulatory standards that could be applied to these types of systems. These systems, being referred to as Transportation Network Measurement Systems (TNMS) do not use a conventional "taximeter" or other dedicated hardware devices that conform to the more traditional design of taximeters however, they provide a similar transportation-for-hire service. Regulatory officials have met with little or no success in attempts to apply existing standards (including those in Section 5.54 Taximeters Code) to TNMS due to differences in the design of these systems and other, existing types of transportation-for-hire services. The hardware components used in TNMS are devices (cellular telephones, computers, tablets) that are typically owned/possessed by the drivers and passengers using the systems and are not designed, sold, issued, or otherwise provide by the Transportation Network Companies. Since there is an absence of dedicated physical hardware used in these systems and because the primary components that are integral to the TNMS consist of various software programs, many members of the weights and measures community and transportation industry have concluded that a new documentary standard, separate from the existing Taximeters Code, is needed.

TNMS have established a large customer base in the transportation-for-hire marketplace and these systems are used extensively in the U.S. as well as internationally. There is a preponderance of public and political support to recognize and accept TNMS as fair-market competition to traditional taxi services. To that point, reasonable and appropriate standards that can be applied for the evaluation of TNMS as commercial systems must be developed and implemented. Primary goals of the implementation of a TNMS code (as well as corresponding changes to the Taximeters code) are to ensure a level playing field within this industry, ensure fair and equitable transactions, ensure transparency for consumers, and to facilitate value comparisons.

The USNWG on Taximeters has worked on the updating of the NIST HB44 Taximeters Code as well as the development of appropriate requirements for transportation systems using location services and software applications since the later portion of 2012. More recently, Transportation Network Companies (TNCs) that are the providers of TNMS have joined this effort and added their input into the standards development process. Because there are instances where taximeters are now being designed to operate using similar features and functionality as TNMS, the USNWG on Taximeters has also developed corresponding changes to the NIST HB44 Taximeters Code in an effort to provide a regulatory parity between these transportation-for-hire industry competitors. Those proposed changes to the Taximeters Code will be submitted under a separate item that already appears on the Committee's agenda (Item 3504-1 on the Committee's 2017 draft agenda) as a "carryover" item.

Proposed change (2):

Anticipating that the proposal to add a new Transportation Network Measurement Systems Code in HB44 will be adopted, there will be a corresponding need to clarify that the existing HB44, 5.54. Taximeters Code will not be applicable to these types of systems. The addition of an exemption under paragraph A.2. in the current Taximeters Code for transportation network measurement systems (TNMS) will make this clear. While this amendment to provide an exemption for TNMS in the current Taximeters Code is to be proposed also under a different agenda item (Item 3504-1, as described above), it is essential that this proposed change be a part of the TNMS item as well. This will help avoid any conflict and confusion regarding the application of the proposed tentative code should this other agenda item should a decision be made to reject or delay Item 3504-1.

Some in the weights and measures community and the transportation-for-hire industry have opposed the development of a new separate HB44 Code for TNMS stating that since those systems perform the same function as a taximeter, TNMS should be assessed based on requirements already existing in the HB44 Taximeters Code. Additional arguments that cite the lack of regulatory standards for TNMS are pointing out the loss of revenue of the traditional-type taxi services due to the increase of competition from TNMS operating in the same jurisdiction. The loss of business being reported by some in the taxi industry has also reportedly resulted in a severe decrease of the value of medallions in many areas where medallions are purchased by taxi companies as a prerequisite to operate in those particular jurisdictions.

Because these system's design and functions are considerably different from the current design of today's taximeters, there are differences between the proposed new HB44 TNMS Code and requirements that are already in (or are proposed to be added to) the existing HB44 Taximeters Code. Some may view the differences between these standards as being unfair and as providing advantages to one over the other; however, the changes that are being proposed under Item 3504-1 should bring the two codes into closer alignment. Additionally, this does not preclude the possibility of a future proposal to merge the two codes as technology evolves.

Item New-11

Summary of comments considered by the regional committee (in writing or during the open hearings):

The committee grouped this Item New 12 with New 11. These items were described as a work in progress as tentative code. It is important for it to move forward and be updated as needed. There was a lot of support from both state and industry. Committee moves to a voting item.

Item as proposed by the regional committee: ***(If different than agenda item)***

Committee recommendation to the region:

- ☒ Voting Item on the NCWM Agenda
- ☐ Information Item on the NCWM Agenda
- ☐ Withdraw the Item from the NCWM Agenda (*In the case of new items, do not forward to NCWM)*
- ☐ Developing Item on the NCWM Agenda *(To be developed by source)*

Reasons for the committee recommendation:

The NEWMA S & T Committee appreciates the hard work and many meetings of the USNWG on Taximeters and recommends the item be Voting.

COMPLETE SECTION BELOW FOLLOWING VOTING SESSION

Final updated or revised proposal from the region: ***(If different than regional committee recommendation)***

Regional recommendation to NCWM for item status:

- ☒ Voting Item on the NCWM Agenda
- ☐ Information Item on the NCWM Agenda
- ☐ Withdraw the Item from the NCWM Agenda (*In the case of new items, do not forward to NCWM)*
- ☐ Developing Item on the NCWM Agenda *(To be developed by source)*
- ☐ Unable to consider at this time *(Provide explanation in the "Additional Comments" section below)*

Regional Report to NCWM: Please provide your report in this section exactly how you want it to appear in the NCWM reports to represent your region's considerations, support or opposition, and recommendations. **This will replace any previous reports from your region on this item.**
The NEWMA S & T Committee appreciates the hard work and many meetings of the USNWG on Taximeters and recommends the item be Voting.

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

ADDITIONAL NEW ITEMS SUBMITTED AFTER AGENDA PUBLICATION

New 28 D Table 3, Parameters for Accuracy Classes (See related item New-29)

Source:
Meridian Engineers Pty Ltd. (2017)

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

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

Table 3.
Parameters for Accuracy Classes

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

U.S. Customary Units			
III[5]	*0.0002 lb to 0.005 lb, inclusive*	*100*	*10 000*
	0.005 oz to 0.125 oz, inclusive	*100*	*10 000*
	equal to or greater than 0.01 lb	*500*	*10 000*
	equal to or greater than 0.25 oz	*500*	*10 000*
III L[3]	*equal to or greater than 5 lb*	*2 000*	*10 000*
IIII	*greater than 0.01 lb*	*100*	*1 200*
	greater than 0.25 oz	*100*	*1 200*

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

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

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

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

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

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

Background/Discussion:

The submitter provided the following comments:

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

.

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

Our product utilizes what we refer to as bolt-on transducers, which make the rail a pseudo load cell. They are not designed to be used as a conventional load cell that can be connected to a standard load cell indicator. They are

only designed for the end application i.e. coupled, in-motion train weighing. Furthermore, our product is not attempting to perform static reference weighing.

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

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

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

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

Item New-28

Summary of comments considered by the regional committee (in writing or during the open hearings):

The committee grouped this Item New 28 with New 29. The submitter gave a presentation on their in-motion weighing rail weighing system in process of getting NTEP certification for the equipment. Points made were reducing minimum scale division values and align acceptance tolerance and assigned accuracy classes.

Item as proposed by the regional committee: ***(If different than agenda item)***

Committee recommendation to the region:

- ☐ Voting Item on the NCWM Agenda
- ☐ Information Item on the NCWM Agenda
- ☐ Withdraw the Item from the NCWM Agenda (*In the case of new items, do not forward to NCWM)*
- ☒ Developing Item on the NCWM Agenda *(To be developed by source)*

Reasons for the committee recommendation:

The NEWMA S & T committee felt that effort made by the submitter to attend NEWMA traveling from Australia, even though the item is not so pertinent in the Northeast but that the other regions may benefit from this proposal; it was decided to forward this item as developing.

COMPLETE SECTION BELOW FOLLOWING VOTING SESSION

Final updated or revised proposal from the region: ***(If different than regional committee recommendation)***

Regional recommendation to NCWM for item status:

- ☐ Voting Item on the NCWM Agenda
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- ☐ Unable to consider at this time *(Provide explanation in the "Additional Comments" section below)*

Regional Report to NCWM:

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The NEWMA S & T committee felt that effort made by the submitter to attend NEWMA traveling from Australia, even though the item is not so pertinent in the Northeast but that the other regions may benefit from this proposal; it was decided to forward this item as developing.

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

New 29 D T.N.3.6. Coupled-in-Motion Railroad Weighing Systems (See related item New-28)

Source:
Meridian Engineers Pty Ltd. (2017)

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

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

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

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

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

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

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

~~**T.N.3.6.4.** For a weighing system used to weigh trains of less than five cars, no single car weight within the group may exceed the static maintenance tolerance.~~
~~(Amended 1990 and 1992)~~

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

0.2 0.5 1 2

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

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

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

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

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

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

c) 1 *d*.

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

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

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

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

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

Background/Discussion:

The submitter provided the following comments:

The proposed changes to Handbook 44 come directly from OIML R 106-1 Edition 2011 (E) Automatic rail-weighbridges. Introducing a range of accuracy classes is more appropriate for these types of weighing systems, given they are mounted on continuous rail and are highly influenced by track conditions, the quality of the rolling stock as well as locomotive driving.

While clause T.N.3.6.1 can be achieved, clause T.N.3.6.2. as it appears currently is simply not achievable for the vast majority of installations. Using a typical example of a weighing system required to weigh in the range of 15t to 100t and a 50kg scale division, this clause essentially states that 65% of individual wagons must have no more than 0.2% error and no single wagon have an error of more than 0.6%. This is not possible for most real life applications. The only way this could be achieved is with perfect track conditions, perfect locomotive driving and perfect rolling stock couplers. The real word typically achieves 90% of wagons at no more than 1% error. The

permissible errors currently detailed in T.N.3.6.2 are more akin to weighing wagons uncoupled statically on isolated rail, not for coupled in motion train weighing systems on continuous, uncut rail.

Our equipment, when installed on the best tracks with best rolling stock actually achieves 0.1% accuracy. However the same equipment installed on substandard tracks and rolling stock will only achieve 1% accuracy. Unless the client spends significant time and money on upgrading track and rolling stock, there is no way they can get a coupled in-motion train weighing system to weigh better than 1%. So in most cases this would not be financially viable.

Aligning Handbook 44 with OIML R 106 also has wider advantages that can be appreciated i.e. systems developed for NTEP certification will also be able to achieve certification in other countries that have adopted the OIML R 106 standard and vice versa.

Establishing a range of accuracy classes will encourage innovation and bring a wider range in design and type of products to the table. There are also opportunities to establish the "lesser" classes as being suitable for infrastructure protection and safety.

The current requirements would mean far greater overall costs to implement an NTEP certified system. It would also typically be far less flexible, in terms of speed range and modes of weighing, than if the tolerances were widened as we are proposing. If our proposal is adopted, more efficient weighing systems would become available, which would be installed at a lesser cost, with a minimum reduction in accuracy

Item New-28

Summary of comments considered by the regional committee (in writing or during the open hearings):

The committee grouped this Item New 28 with New 29. The submitter gave a presentation on their in-motion weighing rail weighing system in process of getting NTEP certification for the equipment. Points made were reducing minimum scale division values and align acceptance tolerance and assigned accuracy classes.

Item as proposed by the regional committee: ***(If different than agenda item)***

Committee recommendation to the region:

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- ☐ Information Item on the NCWM Agenda
- ☐ Withdraw the Item from the NCWM Agenda (*In the case of new items, do not forward to NCWM)*
- ☒ Developing Item on the NCWM Agenda *(To be developed by source)*

Reasons for the committee recommendation:

The NEWMA S & T committee felt that effort made by the submitter to attend NEWMA traveling from Australia, even though the item is not so pertinent in the Northeast but that the other regions may benefit from this proposal; it was decided to forward this item as developing.

COMPLETE SECTION BELOW FOLLOWING VOTING SESSION

Final updated or revised proposal from the region: ***(If different than regional committee recommendation)***

Regional recommendation to NCWM for item status:

- ☐ Voting Item on the NCWM Agenda
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- ☐ Unable to consider at this time *(Provide explanation in the "Additional Comments" section below)*

Regional Report to NCWM:

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from your region on this item.
The NEWMA S & T committee felt that effort made by the submitter to attend NEWMA traveling from Australia, even though the item is not so pertinent in the Northeast but that the other regions may benefit from this proposal; it was decided to forward this item as developing.

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

Jane Zulkiewicz, Town of Barnstable, Massachusetts | Committee Chair
Bradford Bachelder, Maine | Member
Jim McEnerney, Connecticut | Member
John McGuire, New Jersey | Member
Kevin Mikoski, Irving Oil | Associate Membership Representative

Specifications and Tolerances Committee