

National Type Evaluation Program (NTEP) Weighing Sector Meeting Agenda

August 20-21, 2019 / Denver, CO

INTRODUCTION

The charge of the NTEP Weighing Sector is important in providing appropriate type evaluation criteria based on specifications, tolerances and technical requirements of NIST Handbook 44 Sections 1.10. General Code, 2.20 Scales, 2.22 Automatic Bulk Weighing Systems, and 2.24 Automatic Weighing Systems. The Sector’s recommendations will be presented to the National Type Evaluation Program (NTEP) Committee each January for approval and inclusion in NCWM Publication 14 *Technical Policy, Checklists, and Test Procedures* for national type evaluation.

The Sector is also called upon occasionally for technical expertise in addressing difficult NIST Handbook 44 issues on the agenda of National Conference on Weights and Measures (NCWM) Specifications and Tolerances (S&T) Committee. Sector membership includes industry, NTEP laboratory representatives, technical advisors and the NTEP Administrator. Meetings are held annually, or as needed and are open to all NCWM members and other registered parties.

Suggested revisions 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*.

**Table A
Table of Contents**

Title of Contents	Page
INTRODUCTION	1
CARRY-OVER ITEMS	3
1. Recommended Changes to NCWM Publication 14 Based on Actions at the 2019 NCWM Annual Meeting	3
1.a. SCL-1 S.1.1.1. Digital Indicating Elements. and UR.2.10. Primary Indicating Elements Provided by the User	3
1.b. AWS-3 S.3.2. Load Cell Verification Interval Value.....	4
1.c. Block 3 Items (B3) Address Devices and Systems Adjusted Using a Removable Digital Storage Device.....	6
2. HB 44 Scales Code paragraph S.1.2.2.3. Deactivation of a “d” resolution.....	10
NEW ITEMS	12
3. NCWM Publication 14 DES – Field Permanence Tests Sections and Subsections 63.7, 64.3, 65.3, 66.4, 67.6, 68.6, 71.7, 73.1., 74 (Permanence Test Requirements – Minimum Weighments), and 75.3.	12
4. NCWM Publication 14 DES – Section 43. Zero-Tracking Mechanism and Section 44. Discrimination and Zone of Uncertainty.....	12
5. NIST Handbook 44 Scales Code paragraph N.1.5. Discrimination Test	14
6. Discussion on Medical Scales	15
7. NCWM Publication 14 AWS – Section C Certificate of Conformance Parameters	15
ADDITIONAL ITEMS AS TIME ALLOWS	17
8. Implementation of NIST Handbook 44 Scales Code paragraph S.1.2.2.2. Class I and II Scales Used in Direct Sales	17
9. Verifying the Performance Adequacy of a Reference Scale	18
ATTENDEE LIST 2019 MEETING	19

NEXT MEETING:20

Table B
Glossary of Acronyms and Terms

Acronym	Term	Acronym	Term
ABWS	Automatic Bulk Weighing Systems	NCWM	National Conference on Weights and Measures
AREMA	American Railway Engineering Maintenance-of-Way Association	NIST	National Institute of Standards and Technology
AWS	Automatic Weighing Systems	NTEP	National Type Evaluation Program
CC	Certificate of Conformance	OIML	International Organization of Legal Metrology
DES	Digital Electronic Scales	OWM	Office of Weights and Measures
HB 44	NIST Handbook 44	R	Recommendation
IZSM	Initial Zero-Setting Mechanism	SS	National Type Evaluation Program Software Sector
LMD	Liquid Measuring Device	S&T	Specifications and Tolerances Committee
MC	Measurement Canada	SMA	Scale Manufacturers Association
MRA	Mutual Recognition Agreement	WS	National Type Evaluation Program Weighing Sector

Details of All Items
(In order by Reference Key)

CARRY-OVER ITEMS

1. Recommended Changes to NCWM Publication 14 Based on Actions at the 2019 NCWM Annual Meeting

Source:

Mr. Richard Harshman, National Institute of Standards and Technology (NIST) Technical Advisor will provide the Sector with specific recommendations for incorporating test procedures and checklist language based upon actions of the 2019 NCWM Annual Meeting. The Sector is asked to briefly discuss each item and, if appropriate, provide general input on the technical aspects of the issues.

1.a. SCL-1 S.1.1.1. Digital Indicating Elements. and UR.2.10. Primary Indicating Elements Provided by the User

Source:

2019 S&T Committee Final Report

Background/Discussion:

At its 2019 Annual meeting, the NCWM voted to amend NIST Handbook 44 Scales Code paragraph S.1.1.1. Digital Indicating Elements and add a new Scales Code User Requirement (paragraph) UR.2.10 Primary Indicating Elements Provided by the User to provide for a 9.5 mm minimum display height for the measurement units as follows:

S.1.1.1. Digital Indicating Elements

(a)...

(b)...

(c) For electronic cash registers (ECRs) and point of sale systems (POS systems) the display of measurement units shall be a minimum of 9.5 mm (3/8 inch) in height.

[Nonretroactive as of January 1, 2021]

And

UR.2.10. Primary Indicating Elements Provided by the User. - Video display terminals and other user provided indicating elements on scales interfaced with a cash register in a POS system shall comply with the minimum height requirements specified in part (c) of paragraph S.1.1.1. Digital Indicating Elements.

[Nonretroactive as of January 1, 2021]

Discussion/Recommendation: Both paragraphs that were adopted are nonretroactive as of January 1, 2021. The NIST Technical Advisor suggests the Sector develop and recommend amending pertinent sections of NCWM Publication 14 ECR to address the 9.5 mm minimum height requirement specified in paragraph S.1.1.1., subpart (c), with an added statement making aware the effective date. This will avoid having to remember to make the change next year when all that will be needed is for the added statement to be deleted.

Paragraph UR.2.10. is a user requirement and does not impact any parts of NCWM Publication 14. It will be enforced by field officials once it becomes effective.

NIST Technical Advisor’s Note: *It should not be necessary to recommend changes to the DES portion of NCWM Publication 14 based on the adoption of these two requirements for the following reasons:*

- *NTEP’s technical policy, as specified in Part A. of NCWM Publication 14 DES is that a CC include the different applications of the equipment. “POS” is one example of an application included in the technical policy. Recording the application(s) on a CC is considered an NTEP evaluator’s responsibility.*
- *Digital electronic scales interfaced with electronic cash registers (ECRs) in a POS system are evaluated using the checklist in NCWM Publication 14 DES. The NTEP evaluation of the scale may be performed separate from or as part of an electronic cash register.*
- *According to the Introduction Section of NCWM Publication 14 ECRs Interfaced with Scales, the NCWM Publication 14 checklist for electronic cash registers (ECRs) interfaced with scales is supplement to the checklist for digital electronic scales and provides additional considerations applicable only to ECRs.*
- *Since “POS” is an application to be documented on a CC issued under the DES portion of NCWM Publication 14, once the POS application is made known to an NTEP evaluator, the ECR portion of Publication 14 should always be applied.*

The NIST Technical advisor recommends the Sector consider the following two changes to NCWM Publication 14 ECRs Interfaced with Scales:

NCWM Publication 14 Electronic Cash Registers Interfaced with Scales:	
1. Amend the preamble to Section 8. Indicating and Recording Elements – General as follows:	
Code Reference: G-S.5.1., G-S.2., S.1.1., S.1.1.1., and S.1.12.	
A point-of-sale system (POS) shall be designed to provide clear, definite, and adequate indications. <u>The display of measurement units shall be a minimum of 9.5 mm (3/8 inch) in height (to become applicable to equipment evaluated as of 1/1/2021).</u> The Its features and operations <u>of a POS</u> shall be designed so that they minimize the potential of both intentional and unintentional errors.	
...	
2. Add a new 8.1. to the checklist as follows and advance the numbering of all existing subparts of 8.	
8.1. <u>Measurement units shall be a minimum of 9.5 mm (3/8 inch) in height ((to become applicable to equipment evaluated as of 1/1/2021).</u>	<input type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> N/A

Discussion/Conclusion:

1.b. AWS-3 S.3.2. Load Cell Verification Interval Value

Source:
2019 S&T Committee Final Report

Background/Discussion:

This item originated from an NTEP inquiry received in 2018 by a manufacturer of an Automatic Weighing System (AWS) regarding the requirement of satisfying the v_{min} relationship formula when a complete instrument is evaluated to the full temperature range -10 °C to 40 °C (14 °F to 104 °F). The manufacturer questioned why there

was an exception to comply with the formula in the NIST HB 44 Scales Code and not in the Automatic Weighing Systems Code. The item was submitted after last year’s August 1 deadline to submit new items to the WS and for this reason did not make it onto the Sector’s 2018 agenda. The item was, however, considered by the Sector and appears on the 2018 Weighing Sector Summary as Additional Item 8.

During last year’s WS meeting, members of the Sector concluded the omission of the exception criteria from the AWS Code had been an oversight. (See the 2018 WS Final Meeting Summary for additional details). Consequently, the Sector agreed to support the development and submittal of an NCWM proposal to recommend the three criteria that provides the exception of having to comply with the formula in the HB 44 Scales Code be added to the Automatic Weighing Systems Code. Mr. Flocken developed the proposal and after final review by Mr. Rick Harshman (OWM) and Mr. Rob Upright (VPG Transducers and Sector chairman) submitted it to the NCWM.

At its 2019 Annual meeting, the NCWM voted to amend NIST Handbook 44 AWS Code paragraph S.3.2. Load Cell Verification Interval Value as follows:

S.3.2. Load Cell Verification Interval Value. – The relationship of the value for the load cell verification scale interval, v_{min} , to the scale division d for a specific scale installation shall be:

$$v_{min} \leq \frac{d}{\sqrt{N}} \quad \text{where } N \text{ is the number of load cells in the scale.}$$

Note: When the value of the scale division d differs from the verification scale division e for the scale, the value of e must be used in the formula above.

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

- **the complete weighing/load-receiving element or scale has been evaluated for compliance with T.7.1. Temperature under the National Type Evaluation Program (NTEP);**
- **the complete weighing/load-receiving element or scale has received an NTEP Certificate of Conformance; and**
- **the complete weighing/load-receiving element or scale is equipped with an automatic zero-tracking mechanism which cannot be made inoperative in the normal weighing mode. (A test mode which permits the disabling of the automatic zero-tracking mechanism is permissible, provided the scale cannot function normally while in this mode.)**

[Nonretroactive as of January 1, 2020]

Recommendation: The NIST Technical Advisor recommends Publication 14 AWS Section 17 be amended as shown below:

17. Design of Weighing/Load-Receiving Elements - Relationship of v_{min} to d

Code Reference: S.3.2.

17.1 If the scale uses National Type Evaluation Program load cell, the load cell verification interval must satisfy ~~one of~~ the following relationships (use e instead of d if $e \neq d$.) Yes No N/A

$$v_{min} \leq \frac{d}{\sqrt{N}} \quad \text{Where } N \text{ is the number of load cells in the scale without lever systems.}$$

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

- **the complete weighing/load-receiving element or scale has been evaluated for compliance with T.7.1. Temperature under the National Type Evaluation Program (NTEP);**
- **the complete weighing/load-receiving element or scale has received an NTEP Certificate of Conformance; and**
- **the complete weighing/load-receiving element or scale is equipped with an automatic zero-tracking mechanism which cannot be made inoperative in the normal weighing mode. (A test mode which permits the disabling of the automatic zero-tracking mechanism is permissible, provided the scale cannot function normally while in this mode.)**

Discussion/Conclusion:

1.c. Block 3 Items (B3) Address Devices and Systems Adjusted Using a Removable Digital Storage Device

Source:

2019 S&T Committee Final Report

Background/Discussion:

At its 2019 Annual meeting, the NCWM voted to add a new NIST Handbook 44 General Code paragraph to address devices and systems adjusted using removable digital storage devices. The NCWM also voted to amend existing sealing requirements in 18 different device codes of HB 44 by providing an exemption to those requirements for devices and systems adjusted using a removable digital storage device. Although the adoption of these items (in S&T Block 3) will result in changes being made to 19 different codes of HB 44, only 4 of the items adopted in Block 3 will necessitate amendments to the different weighing portions of NCWM Publication 14. The four items adopted that impact different weighing portions of Publications 14 are as follows:

1. General Code B3: GEN-2 G-S.8.2. Devices and Systems Adjusted Using Removable Digital Storage Device

Add new paragraph G-S.8.2. Devices and Systems Adjusted Using Removable Digital Storage Device to HB 44 as follows:

G-S.8.2. Devices and Systems Adjusted Using Removable Digital Storage Device. - For devices and systems in which the configuration or calibration parameters can be changed by use of a removable digital storage device*, such as a secure digital (SD) card, USB flash drive, etc., security shall be provided for those parameters using either (1) an event logger in the device; or (2) a physical seal that must be broken in order to remove the digital storage device from the device (or system). If security is provided using an event logger, 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.)

*** Applies only to removable digital storage devices that must remain in the device or system for it to be operational.**

(Added 20XX)

2. Scales Code B3: SCL-5 S.1.11. Provision for Sealing.

Modify the HB 44 Scales Code as follows:

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

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

(a) *Provision shall be made for applying a security seal in a manner that requires the security seal to be broken before an adjustment can be made to any component affecting the performance of an electronic device.*

[Nonretroactive as of January 1, 1979]

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

[Nonretroactive as of January 1, 1990]

(c) *Audit trails shall use the format set forth in Table S.1.11.*

[Nonretroactive as of January 1, 1995]

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

(Amended 1989, 1991, 1993, and **20XX**)

3. Automatic Bulk Weighing Systems Code B3: ABW-2 S.1.6. Provision for Sealing Adjustable Components on Electronic Devices.

Modify the Automatic Bulk Weighing Systems Code as follows:

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

(Amended 2019)

4. Automatic Weighing Systems Code – B3: AWS-2 S.1.3. Provision for Sealing

Modify the Automatic Bulk Weighing Systems Code as follows:

S.1.3. Provision for Sealing.

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

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

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

(Amended 2019)

Recommendation: The NIST Technical Advisor recommends members of the Sector review the section titled, “Provisions for Sealing Adjustable Components on Electronic Devices” in each of the following weighing portions of NCWM Publication 14 Weighing Devices Handbook: DES, ECRs Interfaced with Scales, ABWS, and AWS and consider the suggested draft changes to those sections shown in the text boxes below. The suggested draft changes are intended to address devices/systems that can be adjusted using a removable digital storage device. Input from the sector is needed concerning whether or not the suggested changes are appropriate and to determine additional changes that might be needed.

Perhaps a project for later (small work group?) would be to develop some additional text in Appendix B of the DES portion Publication 14 that explains the function (intricacies) of a removable digital storage device when used to adjust the calibration and configuration parameters of a commercial weighing device/system. It might also be helpful to include some examples of the different types of storage devices NTEP evaluators and field officials can expect to see.

The following changes are recommended to NCWM Publication 14 DES Section 10:

NCWM Publication 14 DES:

Audit Trails - General

10.1 Verify that the following sealable parameters are secured by a method of sealing.

Category 1 Category 2 Category 3

Removable Digital Storage Device (RDS) that remains in the device for it to be operational

RDS secured in place by a physical seal that must be broken to remove it

Note: For devices and systems adjusted using a RDS, the RDS must either:

- 1. remain in the device or system for the device or system to be operational; or,**
- 2. secured in place by a physical seal that must be broken to remove it.**

For those devices and systems in which the RDS remains in the device or system and is not secured in place by a physical seal, an event logger is required, and all Category 3 sealing criteria contained in this section apply.

For those devices and systems in which the RDS is secured in place by a physical seal that must be broken to remove it, all Category 1 sealing criteria contained in this section apply except that which addresses the use of event counters. Event counters are not permitted as a means of security on devices or systems adjusted using a RDS.

...

No changes are recommended to NCWM Publication 14 ECR Interfaced with Scales. All components of a POS system must comply with Section 10 of the DES checklist if they have a metrological effect on the system.

No changes are recommended to NCWM Publication 14 ABWS Section 7. Subpart 7.1. requests a description of the method used to seal the device, which is believed to suffice.

The following changes are recommended to NCWM Publication 14 AWS Section 8:

NCWM Publication 14 AWS:

8. Provision for Metrological Sealing of Adjustable Components or Audit Trail for Other than Automatic Checkweighers

Code Reference: G-S.8., G-S.8.2., G-S.9., S.1.3.
Due to the ease...

The judgment as to whether or not a method of access to an adjustment represents a "significant potential for fraud" and will normally require sealing for security will be made based upon the application of the following philosophy.

Verify the method of sealing.

Category 1 **Category 2** **Category 3**

Removable Digital Storage Device (RDS) that remains in the device for it to be operational

RDS secured in place by a physical seal that must be broken to remove it

Note: For devices and systems adjusted using a RDS, the RDS must either:

1. remain in the device or system for the device or system to be operational; or,
2. secured in place by a physical seal that must be broken to remove it.

For those devices and systems in which the RDS remains in the device or system and is not secured in place by a physical seal, an event logger is required, and all Category 3 sealing criteria contained in this section apply.

For those devices and systems in which the RDS is secured in place by a physical seal that must be broken to remove it, all Category 1 sealing criteria contained in this section apply except that which addresses the use of event counters. Event counters are not permitted as a means of security on devices or systems adjusted using a RDS.

Category 1 Devices (No Remote Configuration Capability)

...

2. HB 44 Scales Code paragraph S.1.2.2.3. Deactivation of a “d” resolution

Source:

2018 S&T Committee Final Report

Background/Discussion: This item appeared on the 2018 Weighing Sector agenda as Item 1.a. and included not only a discussion of newly adopted Scales Code paragraph S.1.2.2.3. Deactivation of a “d” Resolution, but also a discussion on the interpretation of Scales Code paragraph S.1.2.2.2. Class I and II Scales used in Direct Sales. With respect to the paragraph S.1.2.2.3. Deactivation of a “d” Resolution, there were two recommendations to make changes to NCWM Publication 14 DES suggested by the NIST Technical Advisor, neither of which the Sector believed were immediately necessary after discussing the item. Thus, no changes were recommended by the Sector and the NIST Technical Advisor considers this portion of the item to be completed.

With regard to the Sector’s 2018 discussion on the interpretation of paragraph S.1.2.2.2., the NIST Technical Advisor provided OWM’s interpretation of how the paragraph applies. OWM’s interpretation of paragraph S.1.2.2.2. was that only the scale models having the same value of “d” and “e” would comply with paragraph S.1.2.2.2. as of its date of enforcement. That is, paragraph S.1.2.2.2. would not allow the disabling of the “d” resolution so that only “e” were displayed to enable a scale to be used in a direct sale application. The paragraph specifies the two values must be equal and the information provided on a CC confirms whether they are or aren’t equal. OWM’s interpretation of the paragraph prompted several members of the Sector to offer opinions on how they viewed the proper application of the paragraph and to raise questions concerning OWM’s interpretation of it. Members of the Sector concluded the intent of paragraph S.1.2.2.2. isn’t to require “e” and “d” to be the same value, but rather the paragraph should specify when “e” and “d” are different values, only the “e” value can be displayed on Class I and Class II scales used in a direct sale application. As a result of the Sector’s technical position on this issue, Mr. Rick Harshman (NIST Technical Advisor) and Mr. Darrell Flocken (NTEP Administrator) agreed at the 2018 WS meeting to draft an NCWM Form 15 to amend the paragraph to reflect the Sector’s technical position on this issue.

During the discussion of this item at the 2018 WS meeting, it was also suggested that the mechanism to disable/enable the “d” resolution needed to be secured (i.e., behind whatever means of security is provided). A final concern relating to Sector’s plan to amend paragraph S.1.2.2.2. to allow for the disabling of the “d” resolution is the effect this might have on the display of values for scales that differentiate values of “d” and “e.”

See the 2018 Weighing Sector Meeting Summary for additional details concerning the Sector’s discussion of these two paragraphs and the conclusions reached by the Sector.

2019 NTEP Lab Meeting Discussion of Weighing Labs Item 2. The 2019 NTEP Lab Meeting included an item on the Weighing Labs agenda to discuss the outcome of the 2018 Weighing Sector’s technical position on the application of paragraph S.1.2.2.2. Class I and II Scales used in Direct Sales. The NTEP weighing evaluators were asked to consider the following questions developed by the NIST Technical Advisor relating to the Weighing Sector’s technical position:

1. If disabling of the “d” resolution is permitted on a Class I and II scale in which the values of “d” and “e” are different to allow use of the scale in a direct sale application, what additional NTEP inspection/testing is needed to confirm the scale complies in both applications? (Note: One test thought to be necessary is a test to confirm a scale is rounding properly once the “d” resolution is disabled).
2. What are “display” requirements for the two applications given that Scales Code paragraph S.1.2.2.1. requires the differentiation of the two values when both are displayed.
3. How are evaluators to reference the two applications on a CC so field officials can readily tell from the CC the permissible applications?
4. How are “e” and “d” to be marked on the scale for each application?
5. Must the disabling feature be a sealable event (i.e., behind the seal)?

6. How might paragraph S.1.2.2.2. be changed to reflect and make clear the Sector's interpretation.

OWM also noted that being able to disable the "d" resolution provides a means for service technicians to use the disabling feature to decrease scale resolution which can also change the outcome of a performance test (rejection versus approval).

Measurement Canada's Technical Advisor to the 2019 NTEP Labs reported MC had previously evaluated a scale that a manufacturer wanted to be able to produce. The "d" resolution on this scale could be deactivated using a switch that was behind the security mechanism. Mr. Harshman (NIST Technical Advisor) indicated this is exactly what he believes U.S. scale manufacturers want to be able to do; yet, when this is done, digital rounding may be an issue as well as how the weight information on the scale will be displayed (given the "d" resolution is required to be differentiated from the "e" resolution if "e" and "d" are continuously displayed during normal operation). An additional concern is how field officials will be able to easily determine if a CC issued for the device includes both applications? Mr. Darrell Flocken (NTEP Administrator) suggested manufacturers could make evident the two applications by listing each separately on the CC or including text in the "Standards Features and Options" block on the CC indicating the two different applications.

Mr. Flocken also commented during the 2019 NTEP Lab Meeting he believed the WS's technical position on this issue would not necessarily require a change to Scales Code paragraph S.1.2.2.2. Class I and II Scales Used in Direct Sales. A change to NCWM Publication 14 to allow for the deactivation of the "d" resolution is all that would be needed to include: 1) added test criteria that verifies proper rounding; 2) appropriate display of information; and 3) that the switch is located behind the sealing mechanism. Mr. Harshman concurred with Mr. Flocken's view and agreed to develop a 2019 Weighing Sector proposal to amend NCWM Publication 14 rather than draft proposed changes to paragraph S.1.2.2.2. as was previously agreed at the 2018 WS meeting.

Recommendation:

A discussion on the future implementation of Scales Code paragraph S.1.2.2.2. Class I and II Scales used in Direct Sales is a new item on the Weighing Sector's 2019 agenda (i.e., Additional Item 8) and may result in a Sector recommendation to postpone implementation of the paragraph and/or amendments to the paragraph. For this reason, the NIST Technical Advisor recommends discussing everything related to paragraph S.1.2.2.2. as part of Additional Item 8. Regarding Mr. Harshman's agreement at the 2019 NTEP Lab Meeting to develop a 2019 WS proposal to amend NCWM Publication 14, this work has not been completed because a Sector discussion of Additional Item 8 may result in there being no immediate need to amend NCWM Publication 14 DES.

Since it was decided at the 2019 NTEP Lab Meeting, changes to paragraph S.1.2.2.2. are not needed, the NIST Technical Advisor considers Item 2 of this agenda concluded. The item will not be carried over onto next year's WS agenda.

Discussion/Conclusion:

NEW ITEMS

3. NCWM Publication 14 DES – Field Permanence Tests Sections and Subsections 63.7, 64.3, 65.3, 66.4, 67.6, 68.6, 71.7, 73.1., 74 (Permanence Test Requirements – Minimum Weighments), and 75.3.

Source:

Ohio Department of Agriculture / Ohio NTEP Lab (2019)

Background:

NCWM Publication 14 is limited on its criteria for the field permanence test on what must be submitted for proof that the 300 weighments have been met. Customers are submitting handwritten logs that are unverifiable. In one example, the customer submitted a handwritten log that showed a hopper scale loaded to 500 lb, eight times in one minute, and no return to zero was shown between loads. Since NTEP evaluators are not present during the permanence portion of the field test, there should be written requirements in NCWM Publication 14 that will give confidence to an evaluator that a proper field permanence test was completed in their absence. The wording is not uniform in the sections identified in this proposal and needs to be updated.

Recommendation: Replace text in NCWM Publication 14 DES subsections 63.7.1., 64.3.1., 65.3.1., 66.4 (first bullet), 67.6.1., 68.6.1., 71.7.1.1., 73.1.3.2. (1), 74 Permanence Test Requirements Minimum Weighments Bullets 1 thru 3, and 75.3.1. with the following:

A minimum of 300 weighing operations are required during the test period. Unless these weighing operations are completed in an NTEP laboratory, the applicant, user, or manufacturer is to log the date, time, and weight, either by digitally printing or electronically storing the information. Handwritten logs will not be accepted. Each of the 300 weighing operations shall be printed or stored, to include return to zero as proof that each weighing operation was complete. The person conducting the weighing is to initial each testing.

Only loads that reflect "normal" use will be counted during the permanence-testing period.

Discussion/Conclusion:

4. NCWM Publication 14 DES – Section 43. Zero-Tracking Mechanism and Section 44. Discrimination and Zone of Uncertainty

Source:

Rick Harshman (NIST OWM) on behalf of the 2019 NTEP Weighing Labs

Background:

At the 2019 NTEP Lab Meeting, the NTEP weighing evaluators reviewed NCWM Publication 14 DES procedures for testing a zero-tracking mechanism (AZT) in Section 43 and Discrimination in Section 44 for electronic digital scales. The evaluators determined the procedures in these sections are only intended to apply to scales in which the values of “d” and “e” are equal and cannot nor should not be applied to Class I or II scales in which $d \neq e$.

The procedures in these two sections (43 and 44) should be expanded to address the testing necessary to evaluate AZT and discrimination on Class I and II scales in which $d \neq e$.

Recommendation: There are four recommended changes proposed by this item as follows:

1. *Amend the Test Procedure for AZT shown in Section 43 Zero-Tracking Mechanism on page DES 70 as follows:*

Test Procedure for AZT (Scales in which $e = d$)

1. With the scale at zero balance, place a load in excess of the AZT range for the scale (e.g., $10de$). Add error weights that are slightly in excess of the specified AZT limit for the device or the AZT setting.)
2. Remove the load (e.g., $10de$) but leave the error weights on the scale.
3. Observe whether or not the scale automatically zeroes the error weights.
4. Repeat this procedure by decreasing or increasing the amount of error weights to determine the zeroing range of the AZT.
5. Perform this test in an analogous manner on the negative side of zero to determine the zero range of AZT on the negative side of zero.

2. *Add the following new draft test procedure for AZT (Class I and II scales in which $d \neq e$) immediately below the AZT procedures shown above in Section 43:*

Test Procedure for AZT (Class I and II Scales in which $e \neq d$)

1. With the scale at zero balance, place a load in excess of the AZT range for the scale (e.g., $10e$).
2. Add test weights that are slightly in excess of the specified AZT limit for the device or the AZT setting (e.g., $0.6e$ or $0.7e$). Note that the product of multiplying the value of “e” by a factor of 0.6 or 0.7 may not result in a whole value of “d” if the ratio of the “e” to “d” value is less than 10 to 1, at which case the scale must round to the closest “d” value in accordance with NIST HB44 paragraph G-S.5.2.2.(d)
3. Remove the load applied in step 1. but leave the test weights that were applied in step 2.
4. Observe the scale. It must not automatically zero the load (i.e., the test weights) remaining on the platter
5. Repeat this procedure by decreasing or increasing the amount of test weights to determine the zeroing range of the AZT.
6. Perform this test in an analogous manner on the negative side of zero to determine the zero range of AZT on the negative side of zero.

3. *Amend the title of Sub-Section 44.2 as follows:*

44.2. Discrimination Test (**Scales in which the value of $e = d$ and is $\geq 5\text{ mg}$**). The following tests shall be performed within $10e$ of zero and at the maximum test load.

4. Add a new Sub-Section 44.3. as follows:

44.3. Discrimination Test (Class I and II scales in which $e \neq d$). The procedures for testing discrimination near zero load and near maximum scale capacity when the value of the minimum scale division (d) is not equal to the value of the minimum verification scale division (e), are as follows:

a. **Zero the scale with no load on the platter.**

b. **Apply a test load equal to 2 e to the platter and observe the displayed indication.**

c. **Apply an additional test load of 2 d to the platter and observe the displayed indication.** Yes No N/A

d. **The addition of 2 d in step c. must increase the displayed indication by 2 d.**

e. **For the discrimination test at or near maximum capacity, apply a test load near scale capacity, then remove 2 d and observe the change in the displayed indication.** Yes No N/A

f. **The displayed indication must change by 2 d when a test load of 2 d is removed.**

Discussion/Conclusion:

5. NIST Handbook 44 Scales Code paragraph N.1.5. Discrimination Test

Source:

Rick Harshman (NIST OWM) on behalf of the 2019 NTEP Weighing Labs

Background:

The long-accepted procedures for testing discrimination on digital electronic scales in which $e = d$, specify the use of a test load equaling 1.4 e to change the displayed indication by 2 e on both sides of zero. When $e = 1$ mg or 2 mg on a Class I or II scale, a 1.4 e test load requires the use of decimal milligram test weights to develop the test loads necessary to test discrimination. The NTEP weighing evaluators believe it is very questionable that a field test of discrimination using such small test loads could be performed and there be confidence in the outcome of the results of those tests. Additionally, the evaluators are not aware of any weights and measures jurisdiction that has issued decimal milligram field standard test weights to field staff. Paragraph N.1.5, shown in the box below, specifies a discrimination test be performed on all automatic indicating scales, but it is doubtful the test is being performed in the field when the value of “e” is only 1mg or 2 mg. Some NTEP weighing evaluators recently reported during an NTEP Lab Meeting they too do not possess test standards this small. Measurement Canada recently indicated it possesses a decimal milligram kit, but the test standards in the kit are seldom if ever used.

N.1.5. Discrimination Test. – *A discrimination test shall be conducted on all automatic indicating scales with the weighing device in equilibrium at or near zero load and at or near maximum test load, and under controlled conditions in which environmental factors are reduced to the extent that they will not affect the results obtained. For scales equipped with an Automatic Zero-Tracking Mechanism (AZT), the discrimination test may be conducted at a range outside of the AZT range.*
[Nonretroactive as of January 1, 1986]
(Added 1985) (Amended 2004)

NIST Handbook 44 Scales Code paragraph N.1.5. Discrimination Test

At the 2019 NTEP Lab Meeting, the weighing evaluators considered differences in how discrimination and AZT tests should be performed on Class I and Class II scales in which the value of “e” equals “d” versus when the two are different values ($e \neq d$). The discussion led the evaluators to draft a new proposal to the Weighing Sector (Item 4 of this agenda) recommending changes to the procedures in NCWM Publication 14 DES to address differences in how the AZT and discrimination procedures needed to be performed. During a first review of the draft proposal by those in attendance at the Lab Meeting, it was suggested by Measurement Canada’s Technical Advisor that the changes proposed to the discrimination procedures for scales in which the value of $e = d$, include additional text to exempt the procedures from applying to scales in which the value of “e” is less than 5 mg. This is because most labs are not going to have the decimal milligram test weights to be able to perform the test. It was also pointed out that OIML R 76 includes similar text to exempt discrimination testing on scales with digital indications in which $d < 5$ mg.

HB 44 Scales Code paragraph N.1.5. requires the discrimination test to be performed on all automatic indicating scales. In order to provide an exemption to the procedures in NCWM Publication 14 when $e < 5$ mg, Scales Code paragraph N.1.5. should also provide the exemption since type evaluation is intended to confirm whether or not a device or system submitted for type evaluation complies with HB 44 requirements.

Recommendation: This item is considered companion to the third recommended change in Item 4 of this agenda. That is, in order to apply the exemption proposed by the added text to Sub-Section 44.2, HB 44 Scales Code paragraph N.1.5. should first be amended to provide the same exemption so the two standards (NCWM Publication 14 and NIST HB 44) are uniform with respect to the discrimination testing. The Sector is asked to review the changes proposed to paragraph N.1.5. shown in the box below and if the Sector agrees with the changes, submit the proposal to the NCWM for consideration in the next (2020) Conference cycle.

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

Discussion/Conclusion:

6. Discussion on Medical Scales

7. NCWM Publication 14 AWS – Section C Certificate of Conformance Parameters

Source:

Wipotec-OCS, Inc. (Mr. Benjamin Raham)

Background

Section C of NCWM Publication 14 Automatic Weighing Systems requires all devices submitted to have the widest Load Receiving Element (LRE). This places an undue burden on manufacturers of AWS systems, as it is understood that the industry requires these devices built to suit the needs of end users. This parameter has no

more metrological significance than the Length requirement where a ratio of 4:1 is allowed to accommodate these manufacturing requirements, in order to ultimately satisfy end users. This parameter has no

Recommendation: Two amendments are proposed for Section C. Certificates of Conformance Parameters as follows:

1. *Remove the requirement for widest LRE; and*
2. *Under section “A CC Will Apply to All Models That Have:” change the language regarding width to correspondingly match the statement regarding length.*

The two recommended amendments are shown in the following text box:

<p>Section C. Certificate of Conformance Parameters</p> <p>Certificates of Conformance (CC) shall detail...</p> <p>The Following Guidelines Apply:</p> <p>Device Parameters:</p> <p>...</p> <p>The models to be submitted for evaluation shall be those having:</p> <ol style="list-style-type: none">a. Highest Capacity *...e. Widest Load Receiving Element (LRE) <p>* One device may be submitted to meet a, b, and c.</p> <p>A CC Will Apply to All Models That Have:</p> <ul style="list-style-type: none">• Equivalent metrological hardware and software, including the:<ul style="list-style-type: none">• Same scale (LRE) transport construction (e.g., chain system, belt system)• Same number of load cells• <i>See section D Substitution of Load Cells</i>• ...• Equal or smaller LRE width, including belt width**• <u>Width with 4:1 from both directions of the device submitted (e.g., 10 m submitted, accepted range is 2.5 m to 40 m?) (Determination of width noted on all NTEP CCs)**</u>• Length with 4:1 from both directions of the device submitted (e.g., 10 m submitted, accepted range is 2.5 m to 40 m?) (determination of length noted on all NTEP CC's)• A scale division(e) equal to or larger than that of the device evaluated• Equal or slower scale belt speed*• Equal or smaller capacity of the device evaluated <p>*The manufacturer must specify in the application form whether or not the Automatic Weighing Systems is of a fixed-speed or variable-speed design. If equipped with variable scale belt speeds, the systems covered must have equal or slower scale belt speeds for each weighing range.</p> <p>** The width of the LRE is typically the LRE dimension that is perpendicular to the direction of travel. In some cases, the width of the belt or other conveyor mechanism will represent the width of the LRE if objects can only be weighed on the belt or if the belt or conveyor mechanism is wider than the LRE.</p>
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ADDITIONAL ITEMS AS TIME ALLOWS

If time permits, OWM, NTEP and/or other groups would appreciate input from the WS on the weighing-related issues that are outlined in the remaining agenda items below. For each item in this section, the Sector is asked to review the item and consider providing input that might assist these groups.

8. Implementation of NIST Handbook 44 Scales Code paragraph S.1.2.2.2. Class I and II Scales Used in Direct Sales

Source:

Mettler-Toledo LLC

Background

NIST Handbook 44 Scales Code paragraph S.1.2.2.2. Class I and II Scales used in Direct Sales was added to the Handbook in 2017 and will become enforceable for new scales going on the market in January 2020 with a retroactive date of January 2023. This change was made primarily due to the direct sales of cannabis to customers in several states and the scale operators were inexperienced with the higher precision scales and the need to calculate price only based on values of "e."

An unintended consequence is there are other applications, such as jewelry and gold, where Class I and II scales with "d" ≠ "e" are used by experienced operators and it is not clear whether or not the use of these scales is now permitted in direct sales. Discussions with several states show there is a lack of consistency in how these states interpret “direct sales” as it relates to these applications.

This new specification, if not modified, will result in Class I and II scales that support "d" = "e" for direct sales but are more expensive in order to provide the same suitability for use as is available in "d" ≠ "e" scales. This and the concern that current scales will not be suitable after 2023 will be a burden for those in the jewelry business.

Recommendation: Further discussion is requested with the Weighing Sector to explore the proposed recommendations shown in the text boxes below and other alternatives.

The two recommendations are as follows:

1. *Amend NIST Handbook 44 Scales Code paragraph S.1.2.2.2. Class I and II Scales Used in Direct Sales as follows:*

S.1.2.2.2. Class I and II Scales Used in Direct Sales. – When accuracy Class I and II scales are used in direct sale applications ~~the value of the displayed division “d” shall be equal to the value of the verification scale interval “e.”~~, and "e" does not equal "d," the commercial transaction shall be calculated based on the value of the verification scale interval "e" and not on the value of the displayed division "d."

[Nonretroactive as of January 1, 2020; to become retroactive as of January 1, 2023]

(Added 2017)

2. Amend the current NIST Handbook 44 Appendix D definition of “direct sale” as follows:

direct sale. – A sale in which both parties in the transaction are present when the quantity is being determined. An unattended automated or customer-operated weighing or measuring system is considered to represent the device/business owner in transactions involving an unattended device. [1.10].
Verification of previously weighed and marked items is not considered a direct sale.
(Amended 1993 and 20XX)

NIST Technical Advisor’s note and additional recommendation: Should the Sector, after considering the changes proposed by this item, conclude the changes are not needed or are inappropriate, it is recommended the Sector develop and propose changes to NCWM Publication 14 DES to allow for the deactivation of the “d” resolution to include:

- added test criteria that verifies proper rounding when the d resolution has been deactivated;
- appropriate display of information; and
- that the switch to activate/deactivate the “d” resolution is located/secured behind the sealing mechanism.

9. Verifying the Performance Adequacy of a Reference Scale

Source:

NIST OWM’s Legal Metrology Devices Group

Background

At the 2019 NCWM Annual Meeting, the NCWM adopted amendments to the Belt-Conveyor Scales Systems (BCSS) Code, including adding a new Accuracy Class 0.1 and accompanying Note paragraph that requires the quantity of material used to conduct a material test on a Class 0.1 BCSS to be weighed on a reference scale to an accuracy within 0.035% (which equates to 0.35 lb/1,000 of test load). The tolerance to be applied to an Accuracy Class 0.1 BCSS is +/- 0.1% of the test load. OWM has some questions regarding the means of verifying the accuracy of some scales using procedures that will ensure when those scales are used to weigh material for a material test of a Class 0.1 BCSS, the actual mass of the material is within the 0.035% specified. Mr. John Barton (NIST OWM) and Mr. Rick Harshman (NIST OWM) will provide an overview of some test procedures being developed by OWM that can hopefully be used to confirm the adequacy of the reference scale (when used as a mass comparator) so that the scale can then be used to weigh reference material to within the 0.035% accuracy specified.

Although the NTEP Belt-Conveyor Scale Sector will be considering recommended changes to the Belt-Conveyor Scale and Weigh-Belt Systems portion of NCWM Publication 14 in the near future, it is thought members of the Weighing Sector might find this topic of interest because reference scales are used in other applications and may need to be tested similarly to determine their adequacy for use in weighing material. For example, reference scales are used to verify the performance of CNG Retail-Motor Fuel Dispensers.

ATTENDEE LIST 2019 MEETING

To be added

NEXT MEETING:

The Sector agreed to hold its next meeting **...TBD**