

National Type Evaluation Program (NTEP) Weighing Sector DRAFT Agenda

August 26-27, 2014 / Atlanta, GA

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***.

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Table B
Glossary of Acronyms and Terms

Acronym	Term	Acronym	Term
ABWS	Automatic Bulk Weighing Systems	NEWMA	Northeastern Weights and Measures Association
AREMA	American Railway Engineering Maintenance-of-Way Association	NTEP	National Type Evaluation Program
AWS	Automatic Weighing Systems		
CC	Certificate of Conformance	OIML	International Organization of Legal Metrology
DES	Digital Electronic Scales	OWM	Office of Weights and Measures
IZSM	Initial Zero-Setting Mechanism	R	Recommendation
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 Technical Committee Weighing Sector
NCWM	National Conference on Weights and Measures		

Details of All Items
(In order by Reference Key)

CARRY-OVER ITEMS

1. Recommended Changes to NCWM Publication 14 Based on Actions at the 2014 NCWM Annual Meeting

Source:

Mr. Harshman, National Institute of Standards and Technology (NIST) Technical Advisor, has provided the Sector with specific recommendations for incorporating test procedures and checklist language based upon actions of the 2014 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. DES Section 70. – Performance and Permanence Tests for Railway Track Scales Used to Weigh In-Motion

Source:

Mr. Luthy, Stock Equipment Company, Inc. (2011, 2012, and 2013 Weighing Sector Agenda Items 6, 3, and 3 respectively)

Background / Discussion:

During the 2011 NTEP Weighing Sector Meeting, the Sector discussed a weigh in-motion system using new technology that utilizes continuous rails (no “rail gaps”) on the approaches and weighing areas of the scale. The submitter stated that the manufacturer is currently unable to offer this device for sale in the U.S. in commercial applications because current NTEP type evaluation criteria and *NIST Handbook 44* requirements are written in such a way that makes it impossible for devices incorporating this new technology to comply. For example, *NIST Handbook 44* Scales Code paragraph UR.2.4. Foundations, Supports, and Clearance requires clearance be provided around all live parts to the extent that no contacts may result. *NCWM Publication 14*, DES Section 70, Inspect the Scale, Item 4 Rail Gaps states that “the rail gaps should be set at 3/8 inch.” The *AAR Scale Handbook* includes language that allows 1/8 inch to 5/8 inch rail gaps. The members of the Sector agreed that they were not willing to recommend deleting references to the required gaps in the rail until it is proven that the new technology complies with the tolerances in *NIST Handbook 44*. Thus, the Sector recommended that the applicant move forward with performance testing to confirm that the new technology complies with the tolerances in *NIST Handbook 44*.

Performance testing of the system had not yet been completed when the WS met in 2012. The WS agreed to retain the item on its agenda because there remained an open NTEP application for the device and testing was thought to be ongoing.

During the 2013 WS meeting, Mr. Ed Luthy provided an update on the progress of the testing that had taken place. He reported that the device had met performance requirements for static and in-motion testing and was awaiting final permanence testing. Based on Mr. Luthy’s update, the WS agreed to remove the requirement for 3/8 inch railgaps specified in *NCWM Publication 14*, DES Section 70, “Inspect the Scale” 4. Rail Gaps (Page DES-115, 2013 Edition) and renumber subsequent sections.

See the Interim Report of the 2014 NCWM S&T Committee Agenda Item 320-2 for additional background information on the item to amend HB 44 Scales Code paragraph UR.2.4. Foundation, Supports, and Clearance. (http://www.ncwm.net/resources/dyn/files/1025938z8fff0401/fn/2013_ST_Pub16.pdf).

Recommendation:

No action is being recommended at this time since the requirement for railgaps in *NCWM Publication 14*, DES Section 70, “Inspect the Scale” 4. Rail Gaps (Page DES-115, 2013 Edition) has already been removed (and

subsequent sections renumbered). This update is being provided to make members of the WS aware of the action taken during the 2014 NCWM Annual Meeting on a proposal to amend NIST Handbook 44 relating to this issue.

During the 2014 NCWM Annual Meeting, the Conference voted in favor of amending NIST Handbook 44 Scales Code paragraph UR.2.4. Foundations, Supports, and Clearance. The changes that were adopted provide an exception of having to provide clearance using rail gaps and apply only to in-motion railway track scales designed to be installed and operated using continuous rail. The following changes were adopted:

NIST Handbook 44 Scales Code Paragraph UR.2.4.

UR.2.4. Foundation, Supports, and Clearance. – The foundation and supports of any scale installed in a fixed location shall be such as to provide strength, rigidity, and permanence of all components, and 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 scale. **An in-motion railway track scale is not required to provide clearance using rail gaps to separate the live rail portion of the weighing/load-receiving element from that which is not live if the scale is designed to be installed and operated using continuous rail.** *On vehicle and livestock scales, the clearance between the load receiving elements and the coping at the bottom edge of the platform shall be greater than at the top edge of the platform.**
[*Nonretroactive as of January 1, 1973]

2. Acceptable Symbols/Abbreviations to Display the CC Number Via a Device's User Interface

Sources:

- 2009 NTETC Software Sector Agenda Item 3 and 2010 S&T Item 310-3 G-S.1. Identification. (Software)
- 2010 Final Report of the S&T Committee: ncwm.net/content/annual-archive
- 2010 Software Sector summary: <http://www.ncwm.net/committees/ntep/sectors/software/archive>
- 2011 Software Sector summary: <http://www.ncwm.net/committees/ntep/sectors/software/archive>
- 2011 Final Report of the S&T Committee (Publication 16 and addendum sheets): ncwm.net/content/annual-archive
- 2012 Software Sector summary: <http://www.ncwm.net/committees/ntep/sectors/software/archive>
- 2012 Final Report of the S&T Committee:
http://www.ncwm.net/resources/dyn/files/1025938z8fff0401/_fn/2013_ST_Pub16.pdf
- 2013 Software Sector Summary:
http://www.ncwm.net/resources/dyn/files/981560z45f7a5f5/_fn/12_Software_Sector_Activity.pdf
- 2013 Final Report of the S&T Committee: [Link to be added](#)

Background / Discussion:

Local weights and measures inspectors need a means to determine whether equipment discovered in the field has been evaluated by NTEP. If so, the inspector needs to know at a minimum the CC number. From this starting point, other required information can be ascertained. *NIST Handbook 44* currently includes three options for marking of the CC:

1. Permanent marking
2. Continuous display
3. Recall using a special operation

The following draft summary concerning this item was provided by the Chairman of the Software Sector and is being provided to update members of the Weighing Sector regarding the discussions/actions taken by the SS during their 2013 meeting:

Since its inception the sector has wrestled with the issue of software identification and marking requirements. See the 2012 Software Sector Meeting Summary and the 2013 Interim Meeting S&T Agenda Item 360-2 for more background on this item.

NIST OWM had been adding items to the S&T Agendas that confused matters since the perception was that this sector had contributed to this input. Most of the confusion arose in the 1990's, due to some items being approved, and others, such as the definitions for "Built for Purpose" and "Not Built for Purpose," not being approved.

Mr. Truex, NTEP Administrator, discussed the difficulty there has been in coming to a consensus on these issues with a representative of the NTEP Committee. Suggestions from NTEP to come to some resolution has been to write an article for the newsletter (which Mr. Bliss, Mettler-Toledo, LLC, had already done, to no effect), sending a questionnaire to the NTEP community, asking what they'd like to see, and sending a representative from this sector to the S&T Committee.

Mr. Roach, California Division of Measurement Standards, is concerned that some people may want to interpret G-S.1.c as requiring a serial number for software. Mr. Lewis, Rice Lake Weighing Systems, Inc. pointed out that the computer that the software was running on could have the serial number, not the software itself. That shouldn't matter, regardless.

Mr. Bliss, Mettler-Toledo, LLC, pointed out that the terminology in G-S.1. "All equipment", could be interpreted to mean that it doesn't apply to software. It was proposed that G-S.1.c be amended to add "and software". Mr. Bliss suggested submitting a document explaining the reasoning behind the proposed changes, rather than assume that the text is self-explanatory. Making a presentation to the various committees on the subject in addition would be beneficial as well. If a document is written, perhaps the examples given in G-S.1.d.3.a can be eliminated. "Metrologically significant" isn't explicitly defined, but it's been used since time immemorial.

Attempts to modify G-S.1.1. have been controversial, both in this meeting and in other committees. Unfortunately, there has been little constructive feedback from the other committees. It would probably be easier to incorporate specific examples given in G-S.1.1.b.3 in *NCWM Publication 14*. After some discussion, the previously proposed language was modified slightly to address some of the concerns received via feedback from other sectors and interested parties:

NIST Handbook 44 – Proposed changes:

G-S.1. Identification. – All equipment, except weights and separate parts necessary to the measurement process but not having any metrological effect, shall be clearly and permanently marked for the purposes of identification with the following information:

- (a) the name, initials, or trademark of the manufacturer or distributor;
- (b) a model identifier that positively identifies the pattern or design of the device;
 - (1) *The model identifier shall be prefaced by the word "Model," "Type," or "Pattern." These terms may be followed by the word "Number" or an abbreviation of that word. The abbreviation for the word "Number" shall, as a minimum, begin with the letter "N" (e.g., No or No.). The abbreviation for the word "Model" shall be "Mod" or "Mod." Prefix lettering may be initial capitals, all capitals, or all lowercase.*
[Nonretroactive as of January 1, 2003]
 (Added 2000) (Amended 2001)
- (c) a nonrepetitive serial number, except for equipment with no moving or electronic component parts and ~~not built for purpose software-based software devices~~ **software**;
 - [Nonretroactive as of January 1, 1968]
(Amended 2003)
 - (1) *The serial number shall be prefaced by words, an abbreviation, or a symbol, that clearly identifies the number as the required serial number.*
[Nonretroactive as of January 1, 1986]
 - (2) *Abbreviations for the word "Serial" shall, as a minimum, begin with the letter "S," and abbreviations for the word "Number" shall, as a minimum, begin with the letter "N" (e.g., S/N, SN, Ser. No., and S. No.).*
[Nonretroactive as of January 1, 2001]
- (d) the current software version or revision identifier ~~for not built for purpose software-based electronic devices,~~ which shall be directly linked to the software itself;

[Nonretroactive as of January 1, 2004]

(Added 2003) (**Amended 20XX**)

- (1) *The version or revision identifier shall be prefaced by words, an abbreviation, or a symbol, that clearly identifies the number as the required version or revision.*

[Nonretroactive as of January 1, 2007]

(Added 2006)

- (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.).*

[Nonretroactive as of January 1, 2007]

(Added 2006)

- (3) **The version or revision identifier shall be accessible via the display. Instructions for displaying the version or revision identifier shall be described in the CC. As an exception, permanently marking the version or revision identifier shall be acceptable under the following conditions:**

(a) The user interface does not have any control capability to activate the indication of the version or revision identifier on the display, or the display does not technically allow the version or revision identifier to be shown (analog indicating device or electromechanical counter) or

(b) the device does not have an interface to communicate the version or revision identifier.

- (e) an NTEP CC number or a corresponding CC Addendum Number for devices that have a CC.

- (1) *The CC Number or a corresponding CC Addendum Number shall be prefaced by the terms “NTEP CC,” “CC,” or “Approval.” These terms may be followed by the word “Number” or an abbreviation of that word. The abbreviation for the word “Number” shall, as a minimum, begin with the letter “N” (e.g., No or No.)*

[Nonretroactive as of January 1, 2003]

The required information shall be so located that it is readily observable without the necessity of the disassembly of a part requiring the use of any means separate from the device.

(Amended 1985, 1991, 1999, 2000, 2001, 2003, ~~and~~, 2006 ~~and~~ 201X)

G-S.1.1. Location of Marking Information for ~~Not Built For Purpose~~ All Software-Based Devices. --For ~~not built for purpose~~, software-based devices, either:

- (a) *The required information in G-S.1. Identification. (a), (b), ~~(d)~~, and (e) shall be permanently marked or continuously displayed on the device; or*

- (b) *The CC Number shall be:*

(1) permanently marked on the device;

(2) continuously displayed; or

(3) accessible through an easily recognized menu and, if necessary, a submenu. Examples of menu and submenu identification include, but are not limited to, “Help,” “System Identification,” “G-S.1. Identification,” or “Weights and Measures Identification.”

Note: *For (b), clear instructions for accessing the information required in G-S.1. (a), (b), and (d) shall be listed on the CC, including information necessary to identify that the software in the device is the same type that was evaluated.*

[Nonretroactive as of January 1, 2004]

(Added 2003) (Amended 2006 ~~and~~ 20XX)

The new language in G-S.1.1 reflects that the sector reached consensus on the following positions:

- The software version/revision should (with very few exceptions – see D-31 5.1.1) be accessible via the user interface.
- The means by which the software version is accessed must be described in the Certificate of Conformance (CC).

The sector promoted this item following the meeting via several means to try and address the concerns of other interested parties. A presentation was generated and shared with the S.M.A. at their meeting. The regions had access to this information, as it was posted on the NCWM website. Unfortunately, based on the comments in the 2013 Pub 15 item 360-2, some regions were not aware that this information had been provided.

During the 2013 NCWM Interim Meeting, no comments were received relative to this item during the Open Hearings. In considering the item, the Committee questioned whether or not the Software Sector was still actively working the item. It was reported that the Software Sector believed they had developed the item as much as possible, yet the different stakeholders affected by the proposal could not agree on the changes that the Sector had proposed. Based upon that update, the Committee agreed to add to its report a request that the Software Sector work with the Weighing Sector and Measuring Sector to identify which portions of the proposal need to be modified in order that they might be accepted by the entire community. The Committee acknowledges and appreciates the efforts of the Software Sector and looks forward to being able to consider a proposal that addresses both the identification of software and how it may be accessed.

Since the 2012 meeting, the Sector has attempted to promote this item via several means to try and address the concerns of other interested parties. A presentation was generated and shared with the S.M.A. at their 2012 meeting. Most of the regions had access to this information prior to their meetings, as it was posted on the NCWM website. Unfortunately, based on the comments in the 2013 Pub 15 item 360-2, some regions were not aware that this information had been made available. In addition, it was noted that it may be desirable to evaluate options that would lead to fully eliminating GS-1.1. It was noted that this would be a more invasive modification to the existing Handbook and perhaps should be put off until the first step of addressing software in all devices (not just standalone) was accomplished.

The Sector considers this item sufficiently developed. The one response to our request for review/comment that contained negative feedback was undeniably vague and non-constructive. The issue seems to be more one of communication/understanding than disagreement with the intent or wording. We may want to consider more direct methods, i.e. designating a representative to address the regional groups or other sectors at their meetings. The annual meeting may be an appropriate venue for a presentation.

To move this forward, someone should address the regional groups. There are 5 – 6 potential venues for presentations. The last slide from the current presentation should be eliminated, to avoid confusing matters, for the time being. The two regional meetings in the fall (Western and Southern) and the interim meeting are probably more critical than the ones in May. Dr. Thompson was asked to relay that we have a presentation available and would like to push our proposal as a voting item in 2014. To be part of the January 2014 Annual S&T committee’s hearings / agenda, this needs to be brought to Rick Harshman’s attention. Dr. Thompson volunteered to speak with him.

After removing the “and inseparably” terminology from the proposal, the concerns on the possibility of controversy were reduced.

The Sector’s opinion on the interpretation of “directly linked” is that it means that you can’t change the version/revision without changing the software.

It was recommended that a couple examples be added to the current slide presentation, to illustrate the intent of the proposed changes. One example might be supermarket-specific software designed to run upon a cash register. Another example might be, after a software change, noting that the new software version/revision number is no longer the same, and the operator was not prompted to enter a version/revision number.

Additional background information relative to this item can be found in *2013 NCWM Publication 16* at: http://www.ncwm.net/resources/dyn/files/1025938z8fff0401/fn/2013_ST_Pub16.pdf

Discussion/Recommendation:

This agenda item will be reviewed and discussed in a joint meeting with the Software Sector, which is planned for August 27, 2014. This item is also a “Developing” item on the 2014 S&T Committee’s agenda. During the 2014 NCWM Annual Meeting, NIST OWM provided the following comments concerning the Software Sector’s most recent proposal and the upcoming joint meeting of the Weighing and Software Sectors:

The following two concerns and suggestions were provided concerning the changes proposed to subparagraph G-S.1.(d):

1. Deleting the words “for not-built-for-purpose software-based electronic devices” creates the implication that all equipment manufactured as of January 1, 2004, except weights and separate parts necessary to the measurement process but not having any metrological effect, would be required to be permanently marked with a current software version or revision identifier. OWM questions whether or not it is the Software Sector’s intent to require a software version or revision identifier be marked on equipment that is not electronic. If not the intent, OWM suggests that the Sector consider adding text to better clarify the type of equipment intended to be addressed by this proposed change and offers the following additional text for consideration:

(d) the current software version or revision identifier **for software-based electronic devices**, which shall be directly linked to the software itself;

2. The proposed changes, if adopted, would require a current software version or revision identifier be marked on both built-for-purpose and not-built-for purpose software based equipment manufactured as of January 1, 2004. If it is the intent of the Sector to require that a current software version or revision identifier be marked on built-for-purpose software based equipment, then the Sector might consider proposing that such a requirement be non-retroactive or that it become enforceable at some future date considering the time and cost involved in updating equipment already in service.

The following feedback was provided concerning the Software Sector’s proposed changes to paragraphs G-S.1. and G-S.1.1.:

- It is not clear what equipment would be affected by the proposed changes to G-S.1. (c). By proposing that the word “software” be added, is the exception intended to apply to the software itself or to equipment in which the software is installed?
- In the proposed additions to G-S.1.(d)(3)(a), it is not clear what is meant by the phrase “or the display does not technically allow the version or revision identifier to be shown.” The examples “analog indicating device” and “electromechanical counter” do not provide enough information to lead one to conclude that the intent is to address such things as numeric-only displays. That is, numeric-only displays that don’t have the capability of displaying abbreviations for “version” or “revision” as noted in earlier comments originating from the Sector.
- OWM recommends adding some examples to clarify the types of devices described in paragraph G-S.1.(d)(3)(b).
- OWM agrees with the Software Sector’s assertion that it may be possible to eventually eliminate G-S.1.1. at some future date.

OWM noted that a joint meeting of the Software and Weighing Sectors is planned in August 2014 to consider the current proposal and to try and reach agreement on the changes necessary to paragraph G-S.1. OWM encourages the two Sectors to consider its comments and feedback when considering any changes to the language currently proposed for G-S.1. The approach used in the past has been for the Sectors to review the proposal in separate meeting sessions; however, this has not resulted in a proposal amenable to all Sectors. OWM believes that it might

be more expedient for all of the Sectors to collaborate in a single joint meeting to try and reach agreement on the changes needed.

3. NCWM Publication 14 DES Checklists and Test Procedures Section 1 Marking – Applicable to Indicating, Weighing/Load-Receiving Elements and Complete Scales

Source:

NTEP Labs - 2013 Weighing Sector Agenda Item 7.

Background / Discussion:

A “Note” in Section 1 of the Checklists and Procedures of NCWM Publication 14 Digital Electronic Scales specifies that for consistency purposes the NTEP labs use an Eberhard Faber ink eraser type #110 to verify the permanence of the lettering used to mark required information on a device. It has been reported that this particular eraser may no longer be available in the marketplace. The NTEP lab evaluators had been asked to try and identify a suitable replacement for this eraser; but none had been suggested as of the 2013 WS meeting.

During the 2013 WS meeting, members of the Sector were asked to help identify a suitable replacement eraser; one that could be readily acquired by all the NTEP labs at a reasonable cost so that the NTEP labs could continue testing the permanence of lettering used to mark required information on a device using the same testing medium. An ink eraser called “black pearl” was identified by the WS as a possible replacement and Jim Truex (NTEP Administrator) agreed to look into the possibility of using the “black pearl” eraser as replacement for the Eberhard Faber ink eraser.

Recommendation:

This item has been completed. Mr. Jim Truex (NTEP Administrator) made the recommendation to switch to the “black pearl” eraser after the conclusion of the 2013 WS meeting and all appropriate sections of the 2014 edition of Publication 14 were modified to reflect the change.

NEW ITEMS

4. NIST Handbook 44 Scales Code Paragraph S.5.4 Relationship of Load Cell Verification Interval Value to the Scale Division

Source:

NCWM/NTEP

Background:

NTEP has identified two different interpretations of how to apply the formula specified in NIST Handbook 44 Scales Code paragraph S.5.4. Relationship of Load Cell Verification Interval Value to the Scale Division; specifically, to bulleted item (a). The formula determines the suitability of the v_{min} value of a load cell in relationship to the value of the scale division (d) for scales without lever systems. The different interpretations occur only when applying the formula to a scale having multiple platforms (Weighing/Load Receiving Elements (W/LRE)) where the output of each W/LRE has its own weight display and is capable of operating as an independent scale in a commercial application.

Consider the number of load cells in each W/LRE of the following example scale and how the formula is to be applied:

Platform	Number of Load Cells
1	4
2	4
3	6

The first interpretation applies the formula to the three W/LREs as a single platform using the total of all load cells (14) for the value of “N” in the formula.

The second interpretation applies the formula to each of the three W/LRE’s individually using only the number of load cells (4, 4 and 6) in the W/LRE for the value of “N” in the formula.

Recommendation:

The submitter believes that the second interpretation is correct and suggests the follow actions:

The WS consider completing an NCWM Form 15 and submit it to the S&T Committees of the Regional Weights and Measures Associations proposing the following “Note” be added below the opening paragraph of Section S.5.4. in the 2015 edition of Handbook 44 as follows:

NIST Handbook 44 - 2.20 Scales Code Paragraph S.5.4.
<p>S.5.4. Relationship of Load Cell Verification Interval Value to the Scale Division. – <i>The relationship of the value for the load cell verification scale interval, v_{min}, to the scale division, d, for a specific scale installation using National Type Evaluation Program (NTEP) load cells shall comply with the following formulae where N is the number of load cells in the scale (such as hopper or vehicle scale weighing/load-receiving elements):</i></p> <p>Note: When the scale installation contains two or more W/LREs where the output of each W/LRE produces its own independent weight display and is thus capable of operating as an independent NTEP certificated scale in a commercial application, the value of “N” should be the number of load cells in each individual W/LRE.</p> <p>(a) $v_{min} \leq \frac{d^*}{\sqrt{N}} \quad \text{for scales without lever systems; and}$</p> <p>(b) $v_{min} \leq \frac{d^*}{\sqrt{N} \times (\text{scale multiple})} \quad \text{for scales with lever systems.}$</p> <p><i>[*When the value of the scale division, d, is different from the verification scale division, e, for the scale, the value of e must be used in the formulae above.]</i></p> <p><i>This requirement does not apply to complete weighing/load-receiving elements or scales, which satisfy all the following criteria:</i></p> <ul style="list-style-type: none"> - <i>the complete weighing/load-receiving element or scale has been evaluated for compliance with T.N.8.1. Temperature under the NTEP;</i> - <i>the complete weighing/load-receiving element or scale has received an NTEP Certificate of Conformance; and</i> - <i>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.</i> <p><i>[Nonretroactive as of January 1, 1994]</i> (Added 1993) (Amended 1996)</p>

Upon NCWM adoption of this recommendation, the Weighing Sector will need to revise *Publication 14*, Digital Electronic Scales, Section 22. *Relationship of v_{min} to d and Load Cells*, Section F. *Multiple Load Cell Systems* by adding the same “Note.”

5. NCWM Publication 14 DES Section B. Certificate of Conformance Parameters, Subsection 8. Weighing Systems, Scales or Weighing/load-receiving elements Greater than 30 000 lb Capacity, Paragraph 8.3.2. Range of Parameters for Modular Scales

Source:

NCWM/NTEP

Background:

Current Technical Policy, page DES-8, Section B.8.3.2., of the Digital Electronic Scales (DES) Code states:

"The following range of parameters will be used to establish the sizes and capacities of modular load cell vehicle scales that will be covered on a CC based upon the test of a single scale."

It is believed that as this paragraph is located under Section 8.3. *Modular Load--Cell Vehicle, Livestock, or Railway Track Scales* and there is no other paragraph or section specific to livestock and railway track scales. The paragraph incorrectly limits the parameters stated in "a" thru "j" as applying to only vehicle scales.

Recommendation:

The following proposal is suggested for changing the opening paragraph of Section 8.3.2. to identify that Livestock and Railway Track Scales Certificates of Conformance (CC) have the same range of parameters:

**National Type Evaluation Program
Digital Electronic Scales – Technical Policy**

B. Certificate of Conformance Parameters

...

1. Influence Factors Requirements

...

8. Weighing Systems, Scales or Weighing/load-receiving elements Greater than 30 000 lb Capacity

8.1. Additional criteria for vehicle scales, railway track scales, combination vehicle/railway track scales, and other platform scales over 30 000 lb and up to and including 200 000 lb.

8.2. ...

8.3. Modular Load-Cell Vehicle, Livestock, or Railroad Track Scales

Note: These criteria apply if the scale is fully electronic (e.g., load cells comprise the sensors of the weighing/load-receiving element) and is of a modular design.

Modular Scale

A vehicle, livestock, or railroad track scale made up of individual load-receiving elements of like design, which can be joined together to form a larger integral load-receiving element and can be separated at any time without structurally changing the individual load-receiving elements. This definition is to be applied for all new type evaluations and for applications to add new devices to an existing Certificate of Conformance (CC.)
See figure 3. (Effective January 2001)

8.3.1. Modular Scale to be Tested

...

8.3.2. Range of Parameters for Modular Scales

The following range of parameters will be used to establish the sizes and capacities of modular load cell ~~vehicle~~ scales that will be covered on a CC based upon the test of a single scale.

- a. Nominal capacities not more than 1.5 times CLC for a two-section scale to 135% of capacity of the device evaluated. The nominal capacity for the railroad track scale in a modular vehicle/railroad combination will be no greater than the capacity of the device submitted for evaluation.
- b. Platform area not less than 50% of smallest two-section (four-cell) module incorporated in the device evaluated. Increased lengths for scales with two or more modules are not restricted as long as the width complies with 8.3.2. (e) and the load cells meet the v_{min} formula (e.g., $v_{min} \leq d / \sqrt{n}$.) Additional modules to increase length must be of the same type as those used in the device submitted for evaluation (e.g., 4-cell, 2-cell, and 0-cell.)
- c. CLCs complying with the minimum CLC rating (e.g., not less than 80% of the capacity of one cell) but not exceeding twice the capacity of one load cell.¹
- d. Span(s) between sections which is (are) not more than 20% greater than the span of the largest two-section, four load-cell module evaluated.
- e. Widths up to 120% of the width of the platform tested.²
- f. Nominal capacity equal to or less than CLC times the number of sections minus one-half.
- g. Platform construction and material similar to that of the device evaluated. See section 8.e.
- h. Scale division values equal to or greater than the value of the scale division used in the scale that was evaluated.
- i. Number of divisions (n_{max}) the number of scale divisions that would exist for scales included in the range of capacities provided it does not exceed the n_{max} of the load cells and indicator for the installed system.
- j. Module connection type will be limited to the original type evaluated. The manufacturer may choose to submit a special hybrid design including more than one type of module connection. For example, one module can be connected using welded connections and another can be connected using bolted connections. The resulting CC will cover all the types submitted if the evaluation is successful.

Alternatively, the Sector might consider amending the lead-in sentence of paragraph 8.3.2. to read as follows:

The following range of parameters will be used to establish the sizes and capacities of modular load cell vehicle, livestock, or railway track scales that will be covered on a CC based upon the test of a single scale.

6. NCWM Publication 14 DES Section 10. Provision For Metrological Sealing of Adjustable Components or Audit Trail

Source:

Maryland Weights and Measures/NTEP Labs

Background:

The Maryland NTEP lab was recently performing an evaluation on a device that was subject to the US/Canada Mutual Acceptance Agreement (MRA) and the manufacturer of the device had designed it to be sealed using a

pressure sensitive seal. The design of the sealing mechanism on the device being evaluated complied with existing sealing requirements found in NIST Handbook 44 (i.e., paragraph G-S.8. Provisions for Sealing Electronic Adjustable Components) and current type evaluation criteria in NCWM Publication 14, but did not meet Measurement Canada's laboratory evaluation manual sections 2.4.4 and 2.4.5. NIST Handbook 44 paragraph G-S.8. Provision for Sealing Electronic Adjustable Components has been copied below for reference:

G-S.8. Provision for Sealing Electronic Adjustable Components. – *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]

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.

(Added 1985) (Amended 1989 and 1993)

Recommendation:

Add Measurement Canada's laboratory evaluation manual requirements found in Sections 2.4.4. and 2.4.5. to NCWM Publication 14 DES Section 10 to better harmonize U.S./Canadian type evaluation criteria as it relates to the use of pressures sensitive seals for sealing metrological significant parameters. The NTEP Weighing laboratories have discussed and endorsed adding the Canadian requirements. The following changes are suggested for consideration:

10. Provision For Metrological Sealing of Adjustable Components or Audit Trail

Code References: G-S.8.1. and S.1.11.

The current language in *NIST Handbook 44* paragraph G-S.8. states: "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."

Thus, for parameters protected by physical means of security, once a physical security seal is applied to the device, it should not be possible to make a metrological change to those parameters without breaking that seal. Likewise, for parameters protected by electronic means of security, it should not be possible to make a metrological change to those parameters without that change being reflected in the audit trail. Since this philosophy addresses provisions for protecting access to any metrological adjustment, the philosophy should be applied consistently to all electronic device types.

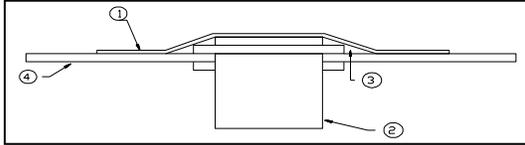
Due to the ease of adjusting the accuracy of electronic scales, all scales (except for Class I scales) must provide for a security seal that must be broken or provide an audit trail, before any adjustment that detrimentally affects the performance of the electronic device can be made. Only metrological parameters that can affect the measurement features that have a significant potential for fraud and features or parameters whose range extends beyond that appropriate for device compliance with *NIST Handbook 44* or the suitability of equipment, shall be sealed.

For additional information on the proper design and operation of the different forms of audit trail, see *Appendix B for the Requirements for Metrological Audit Trails*.

The judgment of 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 *Philosophy for Sealing in Appendix A*.

Use of Pressure Sensitive Seals

Pressure sensitive seals are acceptable under certain conditions. If they cover a hole (e.g., through which a "calibration enable" switch would be activated) the hole must be covered with a suitable rigid plug. The seal must not bridge so as to leave cavities or air pockets under the seal. Cavities and air pockets are weak points that could cause the seal to be easily damaged.



1 Pressure sensitive (paper) seal

2 Keylock

3 Air pocket (void space)

4 Casing

A pressure sensitive security seal is not suitable in an adverse environment (rain, cold, washdown, etc.).

Sealing - General

In addition to satisfying the physical security sealing requirement; the presence of a physical seal shall clearly indicate that the setup or configuration mode (any mode permitting access to any or all sealable parameters based upon the application of the *Philosophy for Sealing in Publication 14*) of the device cannot be accessed without additional actions (e.g., removal of a jumper, pressing a key or switch, etc.) only possible after the removal of the seal.

...

7. NCWM Publication 14 ABWS Technical Policy Section E. Automatic Bulk Weighing Systems - NTEP On-Site Evaluation, and ABWS Checklists Paragraph 32

Source:

NCWM/NTEP

Background:

Current Technical Policy, Section E, of the Automatic Bulk Weighing Systems (ABWS) Code states:

During laboratory evaluation, the bulk weighing controller is tested under simulated field conditions; therefore, the results of such an evaluation should not be used to determine compliance with all pertinent requirements. Compliance with all requirements shall be determined only when the bulk weighing controller, having successfully passed National Type Evaluation Program laboratory evaluation, is installed and tested under actual field conditions as part of an automatic bulk weighing system.

In addition, Paragraph 32. Performance and Permanence Tests for Automatic Bulk Weighing Systems of the ABWS Code states:

The tests described here, apply to the entire automatic bulk weighing system, (e.g., the bulk weighing scale controller interfaced with the weigh hopper, load cell(s), material handling system, etc.). It is assumed that all components of the automatic bulk weighing scale controller have already been examined and found to comply with applicable National Type Evaluation Program requirements. If the design and performance of the bulk weighing controller is to be determined during the same test, the applicable requirements for automatic bulk weighing systems must be referenced.

The wording implies that a complete evaluation of the weighing controller is not possible without connecting the weighing controller to an actual hopper. After discussing this with the NTEP Labs and a few manufacturers it was concluded that the weighing control can receive a complete evaluation in the lab with proper simulation.

Recommendation:

The following changes to Section E of the ABWS Technical Policy and to Paragraph 32 of the ABWS Checklist are suggested to eliminate the requirement of having to test the weighing controller under field conditions providing a complete simulated test can be conducted during lab evaluation:

E. Automatic Bulk Weighing Systems - NTEP On-Site Evaluation

During laboratory evaluation, the bulk weighing controller is tested under simulated field conditions. ~~Therefore, the results of such an evaluation should not be used to determine compliance with all pertinent requirements. Compliance with all requirements shall be determined only when the bulk weighing controller, having successfully passed National Type Evaluation Program laboratory evaluation, is installed and tested under actual field conditions as part of an automatic bulk weighing system. If the simulation is not capable of simulating all functions and operations of a complete system; the weighing controller is to be installed and all functions or operations not simulated during the laboratory evaluation are to be tested under actual field conditions as part of an automatic bulk weighing system.~~

32. Performance and Permanence Tests for Automatic Bulk Weighing Systems

Performance tests are conducted to ensure compliance with the tolerance requirements of *NIST Handbook 44* and for systems used to weigh grain with additional requirements of the GIPSA.

The tests described here, apply to the entire automatic bulk weighing system, (e.g., the bulk weighing scale controller interfaced with the weigh hopper, load cell(s), material handling system, etc.) ~~It is assumed that all components of the automatic bulk weighing scale controller have already been examined and found to comply with applicable National Type Evaluation Program requirements.~~ If the design and performance of the bulk weighing controller is to be determined during the same test, the applicable requirements for automatic bulk weighing systems must be referenced.

...

8. NIST Handbook 44 Scales Code Paragraph S.2.4. Level-Indicating Means and NCWM Publication 14 AWS Section 39 Level-Indicating Means - Portable Automatic Weighing Systems

Source:

Maryland NTEP Lab

Background:

When performing an NTEP evaluation on a “portable” AWS, Section 39 of the AWS checklist specifies that if the device does not have a level-indicating means then the device must be capable of meeting Scales Code paragraph S.2.4. Level Indication Means. It is assumed that any testing necessary to evaluate whether or not a level is needed on a portable AWS would be conducted in a static mode, although nowhere in Publication 14 is it specified. There is no reference in the AWS Code of NIST Handbook 44 that addresses level indicating means on a portable AWS.

Guidance is needed on what components of an AWS the requirement for level indicating means is intended to be applied. The Maryland lab has encountered AWSs that have had a bubble level built into the load receiving element and others that have had level bubbles built into both the load-receiving element and entire system.

There are also no test procedures in the AWS Checklist of Publication 14 to determine the sensitivity of the level indicating means.

Recommendation:

Two recommendations are offered as follows:

1. The Sector consider submitting an NCWM Form 15 proposal to add to the AWS Code of NIST Handbook 44 a paragraph similar to Scales Code paragraph S.2.4., which reads as follows:

S.2.4. Level-Indicating Means. – Except for portable wheel-load weighers and portable axle load scales, a portable scale shall be equipped with level indicating means if it’s weighing performance is changed by an amount greater than the appropriate acceptance tolerance when it is tilted up to and including 5 % rise over run in any direction from a level position and rebalanced. The level-indicating means shall be readable without removing any scale parts requiring a tool.

2. The Sector consider adding the same type evaluation procedures that are in NCWM Publication 14 DES Section 56 to AWS Section 39. These procedures would only be applicable to “Portable” systems that are designed to weigh statically. The following was copied from DES Section 56; the first two paragraphs amended to reflect the intended application to AWS Section 39:

56. Level-Indicating Means - Portable Scales

Code Reference: S.2.4.

~~Portable wheel-load weighers and portable axle load scales intended for law enforcement must weigh accurately when placed out of level by 5%.*~~

A portable ~~scale~~ **Automatic Weighing System (AWS)** which is intended to be **used in static weighing and** moved must either be equipped with a readily observable level-indicating means (typically a bubble level) or the ~~scale~~ **AWS** must still weigh accurately when placed out-of-level by 5% (**approximately 3 degrees**). *Weighing accurately means that the results must be within acceptance tolerance.

The level-indicating means shall be rigidly mounted, located where it will be protected from damage but still be easily read in normal use, mounted so that its reference point for level will not change when pressure is applied to the level-indicator, and sensitive enough to indicate an out-of-tolerance condition that might affect the accuracy of the scale. A bubble level mounted on a swing-out bracket is not adequate. Portable floor scales (generally with capacities of more than 500 lb) shall have the level-indicating means visible without removing any scale parts.

**Note: 5% refers to 5% rise over run.*

- 56.1. Scales (other than wheel-load weighers and portable axle-load scales) must meet one of the following conditions:

56.1.1. The device is equipped with a level indicator as standard equipment? OR Yes No N/A

56.1.2. The device complies with the provisions of S.2.4. The test procedure is given in "Performance Tests for Digital Counter (Bench) and Computing Scales." Yes No N/A

- 56.2. If the scale is equipped with a level-indicating means, it must be readily observable without mechanical disassembly that requires the use of tools. A bubble level placed under the scale platform of a portable floor scale mounted on wheels is not practical for the user of the scale. Yes No N/A

56.3. The level-indicating means is rigidly mounted, easily read, protected from damage, and will not change its reference for level. Yes No N/A

56.4. The level-indicating means is sufficiently sensitive: Yes No N/A

- Except for Scales Designated Accuracy Class I, if the scale is equipped with a level-indicating means, the level indicator must be tested to determine whether or not it's sufficiently sensitive.
- Level Sensitivity Tests (if applicable)
- Test Conditions (both analog and digital indicating scales)
 - This test is performed at ambient temperature only.
 - The device must be leveled using the level indicating means, and adjusted to as close to zero error as possible.

Additional Test Conditions Applicable Only to Digital Indicating Scales:

- The AZT may be activated. It must be set so that the weight value that can be tracked at once does not exceed 0.5 e.
- If the IZSM range of the device does not exceed 20% of Max, the test will be performed with the IZSM set at the maximum of the range.
- If the IZSM range exceeds 20% of Max, the test will be performed twice: the first test with the IZSM set to the lowest possible value; the second test with the IZSM set to the maximum of its range.

NOTE: In the case of a multi-range device, it is 20% of Max of the lowest range; in the case of a multi-interval device, it is 20% of max of the first weighing segment.

- If the device has an "enhance/expanded" resolution feature, perform the test with that feature activated; or use the small weight method to determine errors before rounding.

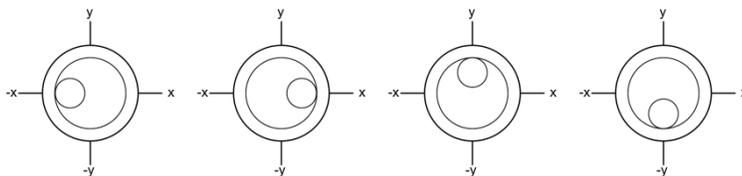
56.4.1. Incline the DUT in one direction (arbitrary referred to as -x) up to the point of limit where the level indicating means still indicates a level condition or at least 2/1 000 (0.12 degree) whichever is greater.

56.4.2. Set the device to zero if necessary; perform an increasing and decreasing load test. If necessary, use the small weight method to find errors before rounding. Record the results.

56.4.3. Record the angle with reference to the horizontal.

56.4.4. Repeat the test described above for the other three inclinations (+x, -y, +y) (See the following illustrations).

Position of the Bubble Indicator:



56.5. Wheel-load weighing and axle-load scales must weigh accurately when placed out-of-level by 5%.*

Yes No N/A

9. NCWM Publication 14 DES Section D. Substitution of Load Cells, Load Cells Section 5.

Source:

NCWM/NTEP

Background:

Current Load Cell Substitution Policy is outdated and needs revised to include the use of new load cell output technology and to make the requirements less open to interpretation.

Recommendation:

Replace the current Load Cell Substitution Policy as found in Section D. *Substitution of Load Cell in Scales* on Page DES-11 and Section 5. *Substitution of Metrologically Equivalent Load Cells in Scales* on Page LC-2 of the 2014 edition of NCWM Publication 14, Weighing Devices with the following:

In a Weighing/Load Receiving Element with a single or multiple load cells installed, the replacement of one or more load cells, from the same or a different manufacturer, is considered a metrologically equivalent replacement provided requirements (1) through (7) below are met.

1. **The original and the replacement load cells have a Certificate of Conformance from having been evaluated individually and not as a component in a complete weighing instrument.**
2. **Have as many or more verification scale intervals (n_{max}) as required for the scale's capacity and division size.**
3. **Have a minimum load cell verification interval (v_{min}) that is suitable for the application.**
4. **Are of the same load cell design as the cell being replaced. Note: load cell design defines the physical design of the load cell. e.g. canister compression, dual ended shear beam, etc...**
5. **Have a capacity equal to or greater than 85% of the capacity of the load cells installed during type evaluation testing.**
6. **Can be placed in the scale without any modification, as defined in Publication 14, Digital Scales Code, Technical Policy, to the basic design of the Load Receiving Element or the load cell mounting assembly. Note: The use of spacers to compensate for differences in load cell height is permitted.**
7. **Utilize the same output technology (e.g. analog, digital, hydraulic, etc...) as all other load cells in the system or weighing element. Note: For replacement load cells with analog output technology; the same wiring configuration must be maintained as the cells being replaced without adding jumper wires, connecting sense wires to excitation wires, or by removing the sense leads.**

In a system with multiple load cells, the replacement of ALL load cells in the system with National Type Evaluation Program certified and compatible load cells that have an output technology different than the original load cell is considered a metrologically equivalent replacement provided all requirements in (1) through (6) above are met.

10. NCWM Publication 14 Load Cells Section L. Procedures - Table 3.

Source:

NCWM/NTEP

Background:

Tolerances for the evaluation of Class I & II load cells are not mentioned in the load cell section of the 2014 edition of NCWM, Publication 14, Weighing Devices.

Recommendation:

Insert two new tables under the existing Table 3 heading located on page LC-10 of the 2014 edition of NCWM, Publication 14, Weighing Devices. Table 3 currently has a tolerance table for Class III load cells. This proposal would add the two tables shown. (One table for Class I tolerances and the second table for Class II tolerances).

Table 3 Tolerances for Class I Load Cells				
<i>NIST Handbook 44</i> Reference	Single Cell Requirement		Multiple Cell Requirement	
Load Cell Error Table 6., Class I; T.N.3.2. and T.N.8.1.1.	0.7 Factor Applied		1.0 Factor Applied	
	Load	Tolerance	Load	Tolerance
	0 – 50 000v	0.35v	0 – 50 000v	0.50v
	50 001 – 200 000v	0.70v	50 001 – 200 000v	1.00v
	200 001v +	1.05v	200 001v +	1.50v
Repeatability Error; T.N.5. and T.N.8.1.1.	0.7 Factor Applied		1.0 Factor Applied	
	Load	Tolerance	Load	Tolerance
	0 – 50 000v	0.70v	0 – 50 000v	1.00v
	50 001 – 200 000v	1.40v	50 001 – 200 000v	2.00v
	200 001v +	2.10v	200 001v +	3.00v
Temperature Effect on Minimum Dead Load Output; T.N.8.1.3. and T.N.8.1.1.	0.7 v_{min}/5 °C		0.7 v_{min}/5 °C	
Effects of Barometric Pressure; T.N.8.2.	Applicable only to specified load cells 1 v_{min}/1kPA		Applicable only to specified load cells 1 v_{min}/1kPA	

Tolerances for Class II Load Cells				
<i>NIST Handbook 44</i> Reference	Single Cell Requirement		Multiple Cell Requirement	
Load Cell Error Table 6., Class II; T.N.3.2. and T.N.8.1.1.	0.7 Factor Applied		1.0 Factor Applied	
	Load	Tolerance	Load	Tolerance
	0 – 5 000v	0.35v	0 – 5 000v	0.50v
	5 001 – 20 000v	0.70v	5 001 – 20 000v	1.00v
	20 001v +	1.05v	20 001v +	1.50v
Repeatability Error; T.N.5. and T.N.8.1.1.	0.7 Factor Applied		1.0 Factor Applied	
	Load	Tolerance	Load	Tolerance

	0 – 5 000v	0.70v	0 – 5 000v	1.00v
	5 001 – 20 000v	1.40v	5 001 – 20 000v	2.00v
	20 001v +	2.10v	20 001v +	3.00v
Temperature Effect on Minimum Dead Load Output; T.N.8.1.3. and T.N.8.1.1.	0.7 v_{min}/5 °C		0.7 v_{min}/5 °C	
Effects of Barometric Pressure; T.N.8.2.	Applicable only to specified load cells 1 v_{min}/1kPA		Applicable only to specified load cells 1 v_{min}/1kPA	

Tolerances for Class III Load Cells (This current wording already appears beneath Load Cells Table 3 and is shown for positioning of the two new tables being proposed for addition)

Submitter’s Note: If this proposal is not supported, the WS might consider proposing the removal of all existing references and statements related to Class I & II load cells from NIST Handbook 44 and NCWM Publication 14 under the premises that no CC has been issued for a Class I or II load cell (needs confirmation) and NTEP will release a statement indicating that no CC will be issued for Class I or II load cells.

11. VCAP Influence Testing of Weighing/Load Receiving Element With a Capacity ≤ 2000 LB

Source:

NCWM/NTEP

Background:

During a VCAP device type discussion it was noted that a W/LRE with a capacity ≤ 2000 lb using a load cell with an NTEP CC is required to undergo influence factor testing during type evaluation. This requirement is determined by reviewing the information in the table titled “Devices to Be Tested For Influence Factors” located in the 2014 edition of *Publication 14, DES Technology Policy*, paragraph B.1. on page DES-3. The requirement is determined by the fact that there is no distinction between a W/LRE with a capacity ≤ 2000 lb using a load cell with an NTEP CC and those using non-NTEP load cells and the fact that W/LRE’s with a capacity ≤ 2000 lb can be evaluated in a laboratory environment and will fit inside the labs temperature chamber.

This information supports the requirement that this device type should be included in the list of devices that are subject to the VCAP requirement of ongoing internal auditing by the manufacturer. However, several manufacturers have voiced their concern with this as they believe that a W/LRE with a capacity ≤ 2000 lb using a load cell with an NTEP CC should not be included in VCAP. The reason provided is that the load cell is covered by VCAP and it is the only part of the W/LRE that is influenced by temperature changes.

Recommendation/Discussion:

Before I offer a proposal for consideration, I would like to ask the Weighing Sector to discuss this subject to provide technical support for or against adding this device type to the VCAP list. The most important but not the only question at this time is:

- Is the load cell the only part/component of the W/LRE that is influenced by changes in temperature?

It would be great if the members of the Weighing Sector could come to a consensus on this matter however, I will caution you that going blindly in one direction or the other could lead to significant changes in current NTEP Policy. If consensus determines that other parts/components of the W/LRE are influenced by changes in temperature, current NTEP Policy remains intact and the device type will be added to the VCAP device list.

If consensus determines that the load cell is the only part/component of the W/LRE that is influenced by changes in temperature, the table titled “Devices to Be Tested For Influence Factors” will need to be modified to include W/LRE with a capacity ≤ 2000 lb using a load cell with an NTEP CC as a separate device and identify them as being exempt from influence factor testing during NTEP evaluations and the device type would not be added to the VCAP list.

1. The list of devices current listed in the 2014 edition of the *NTEP Administration Policy*, paragraph **21.1.3.1. Devices that Must Meet this Requirement are Limited to the List Below**.
2. The table titled “Devices to Be Tested For Influence Factors,” is shown below for ready reference.

Devices to Be Tested For Influence Factors							
Device Type	Temperature Accuracy ⁷	Temperature Zero Drifts	Barometric Pressure	Warm-up Time	Voltage ⁴	Power Interruption ⁵	Time Dependence
Scales ≤ 2000 lb	X	X	X ¹	X	X	X	X
Scales ≥ 2000 lb	X ²	X ²	X ²	X	X	X	X ²
ECR's Computers, Bulk-weigher Controllers (without A/D)						X	
Printers						X	
Dials (spring)	X	X					X
Leaver/beam Scales and Pendulum Dials							
Weighing/ Load-Receiving Elements	X	X	X ¹				X
Indicating Element ⁶	X	X		X	X	X	
Class II Scales	X	X		X ³	X	X	X
Load Cells							
Canister-Type	X	X	X ¹				X
Hydraulic	X	X					X
All Others	X	X					X

¹ Testing is limited to some canister load cells.
² Compliance with influence factors requirements will be determined according to existing NTEP policy.
³ Test limited to power switch only, not to initial plug-in of the device.
⁴ Voltage test is 130 and 100 VAC and low battery test on DC. *See Section K.60.*
⁵ Power interruption is pulling the plug for 10 seconds. *See Section K.19.*
⁶ Indicating elements processing only digital information do not have to be tested for compliance with the influence factors.
⁷ Compliance with temperature requirements by NTEP is limited to temperatures that are no lower than -10 °C and no higher than 40 °C.

12. NCWM Publication 14 DES Section 43. Zero-Tracking Mechanism

Source:

Rice Lake Weighing Systems

Background:

Clarify how AZT operates in the NET mode.

Recommendation:

Add procedures in Publication 14 DES Section 43. Zero-Tracking Mechanism for testing AZT in the NET mode. The following changes are suggested:

43. Zero-Tracking Mechanism

Code Reference: S.2.1.3., S.2.1.3.1., S.2.1.3.2. and S.2.1.3.3

A scale may be equipped with an automatic zero-tracking mechanism (AZT) capability to automatically correct for weight variations near zero within specified limits. To reduce the potential for weighing errors, the AZT may operate only under limited conditions as indicated in the specific type evaluation criteria. Automatic zero-setting (setting the scale to zero after a period of time without the intervention of the operator) beyond the limits of AZT as defined in OIML R76 as an automatic zero-setting mechanism is not permitted in *NIST Handbook 44* since there is no limit on the amount of zero adjustment in *NIST Handbook 44*.

...

For bench, counter, and livestock scales falling under S.2.1.3.1. (a) and S.2.1.3.2 (b) AZT may be operable with the device at a gross load zero, at a net load zero or at a negative net weight indication resulting from a tare weight entry having been made with the scale at zero gross load.

For scales other than bench, counter, and livestock scales falling under S.2.1.3.1. (a) and S.2.1.3.2. (b) ~~and vehicle, axle load and railway track scales,~~ AZT may be operable only at a gross load zero.

Indicate where AZT is operational:

- Gross Zero
- Net Zero
- Negative with Tare

Test Procedure for AZT

1. With the scale at zero balance, place a load in excess of the AZT range for the scale (e.g., 10d. 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., 10d) 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.

Test Procedure for AZT in the NET Mode

- 1. With the scale at zero balance, place a load on the scale then TARE this weight.**
- 2. Add a ¼ of a scale division to the scale then observe that the indication stays at the center of zero.**
- 3. Repeat the operation three more time until there is one hole division that has been zeroed off**
- 4. Switch to Gross Mode**
- 5. The indication should display the TARE weight plus 1 division.**

If the device has an AZT capability, record the maximum amount (in scale divisions) that can be zeroed at one time:

- Avoirdupois _____ d
- Metric _____ d
- Other Units: Specify Unit _____ d

...

13. NCWM Publication 14 DES Section D. Substitution of Load Cells, Load Cells Section 5

Source:

Henry Oppermann, Weights and Measures Consulting

Background:

The term “hydraulic compression load cell” has been used on NTEP CCs for two different types of load cells. One type of load cell has a hydraulic load sensor and hydraulically totalizes the output from multiple load cells. The other type has a hydraulic load sensor and a pressure transducer with strain gauges on each load cell to convert the output to a digital signal. The digital output is then totalized. Purchase specifications have stated that scales have “hydraulic load cells.” It is necessary to distinguish between these two types of load cells.

The NTEP CC states that the pressure transducer is considered to be part of the metrological system included in the evaluation of the hybrid load cell. If a “hybrid hydraulic/electronic load cell” in a scale fails, do both the hydraulic component and the electronic component have to be replaced to repair or replace the load cell?

Are the “hybrid hydraulic/electronic load cell” and the “hydraulic load cell” considered to be the same design and, therefore, the same type of load cell?

Under NTEP policy for the substitution of load cells in scales, can all of the “hydraulic load cells” in a scale be replaced with the “hybrid hydraulic/electronic load cells” without requiring a new type evaluation, i.e., does NTEP consider this replacement of load cells to be metrologically equivalent? Would the proposed change in Item 9 on the Weighing Sector agenda change the interpretation?

The current practice to categorize the two types of load cells as hydraulic load cells is misleading and causes confusion. The two load cell types should be considered different types based upon their design. The load cell with hydraulic load sensor and hydraulic output should be called a “hydraulic load cell.” The load cell with a hydraulic load sensor and electronic output should be called a “hybrid hydraulic/electronic load cell.” This terminology should be used on NTEP CCs.

The following response was received from Tina Butcher, NIST OWM, on this subject:

This is in response to your request for a definition of a “hydraulic load cell.”

As you are probably aware, there are references on the internet to the phrase, including sites such as Wikipedia and on web sites of companies that manufacture what are typically described as “hydraulic” load cells. However, I have been unable to find any formal definition that has been reviewed and agreed upon by the legal metrology community.

I did a search of the definitions section of NIST Handbook 44 as well as the Load Cells and Digital Electronic Scales Checklists in NCWM Publication 14 and found no formal definition for “hydraulic load cell.” I also did an electronic search of past summaries of the NTETC Weighing Sector from 1987 to 2013. While there were several references in the summaries to “hydraulic load cells,” I did not find any definition(s) or specific descriptions of these devices. Rick Harshman, one of our weighing experts, and I also searched through various terminology documents we have in our files, including past Scale Manufacturer Association “Terms and Definitions” and an international Basic and General Vocabulary of Metrology. Additionally, I contacted John Barton of our office who serves as Secretariat to OIML Recommendation 60, Load Cells. John indicated that previous editions of R60 have not included any definition for “hydraulic load cells.” In addition, the current edition (now under revision) is being drafted to avoid the inclusion of definitions for specific technologies and designs. This is being purposely done to avoid any interpretation that R60 will apply to some types of load cells, but not others.

I spoke with Kevin Chesnutwood a load cell expert in NIST’s Mass and Force Group and shared your questions with him. Kevin indicated that he is not aware of any formal definition for “hydraulic load cell.” With regard to the load

cells tested by the Mass and Force Group over the years, load cells referred to as “hydraulic” have most typically channeled hydraulic fluid into a totalizing component (a totalizer) which converts the pressure of the hydraulic fluid into an electronic signal using either strain gauge or pressure technology. This description is closest to the scenario referenced in the second question in your letter “Is a load cell that has a hydraulic input and then uses strain gauges to convert the hydraulic input to an electronic output considered a hydraulic load cell....”

With regard to your specific situation in which you are preparing to place a bid with the [REDATED] in which the solicitation references “hydraulic compression stainless steel load cells,” we don’t have any way of knowing whether their use of the terminology “hydraulic” is referring to the same general understanding that we have of that term. Thus, you may wish to contact [REDATED] to determine what specific type of cell they intend to reference and the reason why this type of cell is specified to get a better understanding of what is needed to meet their requirements. Since you have noted that [REDATED] has allowed for the submission of written questions by July 2, it would seem that your questions about the term as it is used in the solicitation would be best posed to them through that process; particularly since they will be making the final decision on what constitutes a qualified bid.

Although I wasn’t able to locate a formal definition within the legal metrology community documents/materials, I hope the information provided from the search is of help to you.

With Best Regards,
Tina

Recommendation:

The Sector identify and develop a complete and unambiguous list of the different types of load cells and include it in NCWM Publication 14 DES Section D.

When completing an NTEP CC for a hydraulic type load cell that’s been evaluated, identify on the CC the type of hydraulic load cell (i.e. hydraulic load cell or hybrid hydraulic/electronic load cell) for which the CC applies.

ATTACHMENTS

Appendix A - 20013 NTEP Weighing Sector Attendees (to be included in the Sector report)