# Appendix D

## National Type Evaluation Technical Committee
## Weighing Sector

## September 26 - 28, 2006, Annapolis, Maryland
## Meeting Summary

| Glossary of Acronyms | | | |
|---|---|---|---|
| AWS | Automatic Weighing Systems | NTETC | National Type Evaluation Technical Committee |
| CC | NTEP Certificate of Conformance | OIML | International Organization of Legal Metrology |
| CIM | Coupled-in-Motion (Railway Track Scales) | S&T | NCWM Specifications and Tolerances Committee |
| CLC | Concentrated Load Capacity | SWMA | Southern Weights and Measures Association |
| EPO | Examination Procedure Outline | W/LRE | W/LRE |
| GIPSA | Grain Inspection Packers and Stockyards Administration | WG | Work Group |
| NCWM | National Conference on Weights and Measures | WMD | Weights and Measures Division |
| NIST | National Institute of Standards and Technology | WWMA | Western Weights and Measures Association |
| NTEP | National Type Evaluation Program | | |

Unless Otherwise Stated:
- "Handbook 44" (HB 44) means the 2006 Edition of NIST Handbook 44 "Specifications Tolerances, and Other Technical Requirements for Weighing and Measuring Devices"
- "Handbook 130" (HB 130) means the 2006 Edition of NIST Handbook 130 "Uniform Laws and Regulations in the areas of legal metrology and fuel quality."
- "Publication 14" (Pub. 14) means the 2006 Edition of NCWM Publication 14 - Weighing Devices - Technical Policy • Checklists • Test Procedures
- "Sector" means the NTETC Weighing Sector.

Note: NIST does not imply that these acronyms are used solely to identify these organizations or technical topics.

**Details of All Items**
(In Order by Reference Key Number)

## Carry-over Items:

## 1. Recommended Changes to Publication 14 Based on Actions at the 2006 NCWM Annual Meeting

The NIST Technical Advisor, Steve Cook, provided the Sector with specific recommendations for incorporating test procedures and checklist language based upon actions of the 2006 Annual Meeting of the 91st NCWM. The Sector was asked to briefly discuss each item and provide general input on the technical aspects of the issues.

### 1(a). G-S.1. (d) Identification and G-S.1.1. Location of Marking Information for Not-Built-for-Purpose Devices

**Background:** See the Report of the 2006 NCWM, S&T Committee agenda Item 320-1 for additional background information. During its 2006 Annual Meeting, NCWM agreed to addend NIST Handbook 44 Section 1.10. paragraph G-S.1.(d) Identification to include requirements for identifying the required software version designation for not-built-for-purpose devices using acceptable words, abbreviations, or symbols and amend G-S.1.1. to clarify the location requirements for the required information in G-S.1.

**Discussion:** The Weighing Sector discussed a proposal from the NIST Technical Advisor to consider amending NCWM Publication 14 Technical Policy, Checklists, Test Procedures for Weighing Devices, Electronic Cash Registers Interfaced to Scales, Automatic Bulk-Weighing Systems, and AWS. The Technical Advisor reported that the language adopted by the NCWM was edited by NIST after the proposed amendments to Publication 14 were developed. As a result, the language drafted by the Technical Advisor required substantial revisions and were not ready to be reviewed by the Sector. Additionally, the NTEP Director, Stephen Patoray, recommended that the proposed changes to Publication 14 AWS type evaluations procedures be considered by the AWS Work Group (WG) instead of the Sector.

**Recommendation: The Weighing Sector recommends that the proposed amendments in the agenda be revised and presented to the Sector as a ballot item on the Publication 14 Scales and Electronic Cash Registers Interfaced with Scales checklists as shown in Appendix A – Attachment for agenda Item 1(a). The result of the ballot will be forwarded to the NTEP Committee prior to the January 2007 NCWM Interim Meeting. The Sector also recommended that the proposed amendments to the type evaluation procedures to the AWS checklist be forwarded to the AWS Work Group for their consideration.**

### 1(b). Time Dependence – Non-automatic Weighing Instruments

**Background:** See the Report of the 2006 NCWM, S&T Committee agenda Item 320-6 for additional background information regarding the discussions to amend Handbook 44 requirements for load cell time dependence tests. During its 2006 Annual Meeting, the NCWM agreed to amend NIST Handbook 44 2.20. Scales Code paragraph T.N.4.5.1. Time Dependence; Class II, III, and IIII Non-automatic Weighing Instruments as follows to harmonize further the type evaluation test conditions with procedures included in OIML requirements.

**Discussion/Recommendation: The Sector recommends that amendments proposed in Appendix A – agenda Item 1(b) be incorporated into NCWM Publication 14 DES Section 58. Time Dependence Test.**

### 1(c). Time Dependence – Load Cells

**Background:** See the Report of the 2006 NCWM, S&T Committee agenda Item 320-7 for additional information on the discussion to add creep test tolerances, procedures, and corresponding terminology and definitions. During its 2006 Annual Meeting, the NCWM agreed to amend NIST Handbook 44 2.20. Scales Code paragraph T.N.4.6. Time Dependence (Creep) for Load Cells During Type Evaluation, Table T.N.4.6., and add a new paragraph T.N.4.7. Creep Recovery for Load Cells during Type Evaluation. These changes are intended to harmonize further the type evaluation test conditions with procedures included in OIML recommendations; add creep recovery requirements and the appropriate apportionment factors for Class III L load cells that were inadvertently omitted from the language added to NIST Handbook 44 in 2005; and add definitions for the terms and abbreviations used in new paragraph T.N.4.7.

**Discussion/Recommendation: The Sector recommends that amendments proposed in Appendix A for agenda Item 1(c) be incorporated into NCWM Publication 14 FT (Force Transducers), Sections 13 and 14 "Determination of Creep."**

## 2. S.1.1.(c) Zero Indication (Marking Requirements)

**Source:** 2004 Weighing Sector agenda Item 4 - S.1.1.(c). Zero Indication (Marking Requirements).

**Background:** See the Report of the 2006 NCWM, S&T Committee agenda Item 320-1 for additional background information regarding the justifications for and against the proposed language to amend Scales Code paragraph S.1.1.(c) Zero Indication (Marking Requirements).

**Discussion/Recommendation: This item was included in the agenda to provide the Sector with an update on the status of this item. The Sector was asked if there was any new information that could be forwarded to the S&T Committee on agenda Item 320-1. Members of the Sector stated that there is no recommended change to their 2005 position that stated that the Sector does not support the proposal, and that they continue to agree that additional markings should not be required on devices that have an effective means to inhibit a weighing operation or return the device to a continuous digital indication when the scale is in an out-of-balance condition.**

## 3. Bench/Counter Scale Shift Test and Definitions

**Source:** NIST WMD and 2005 NTETC Weighing Sector (Carryover Item)

**Background:** This item has been added to the agenda as an update to the 2005 Weighing Sector agenda Item 4. Please refer to the 2005 NTETC Weighing Sector Meeting Summary agenda Item 4 and the 2006 NCWM S&T Committee Final Report on agenda Item 320-3 for additional background information.

Based on the comments received during the 2006 NCWM Annual Meeting, the NIST Technical Advisor to the Weighing Sector amended the language in the proposal as summarized below:

**Summary of Proposed Changes**

1. Made it clear that no significant changes are being made to two-section livestock scales,
2. Simplified the language for the shift test on "Other" scales,
3. Grouped the livestock scale shift test requirements together,
4. Changed the order of the "test notes" so that the more common type of scales are listed first, and
5. Made minor editorial suggestions on the existing language.

**Discussion:** The Sector considered e-mail comments from the PTB and John Elengo stating that there is a higher risk of overloading one of the (multiple) supports by using a ½ capacity load in an eccentric loading test pattern than by using a ⅓ capacity load. This appears to stem from the difference in test method between Handbook 44 and OIML R 76. Handbook 44 more or less assumes a rectangular platform and places the load at a point on a line half

way from the center to edge, whereas OIML R 76 acknowledges that platforms might exist in other shapes, such as in square, triangular, or circular platforms. Thus, OIML R 76 depends more on placing the eccentric load in a prescribed section of the total area of the platform rather than on a specific line; they more or less trust the load will be placed at the center of the quadrant according to the figures in OIML R 76 for scales with four or less supports. The conclusion made by these comments is that off-center moment (load times distance) in both methods, especially with rectangular platforms, is more or less the same.

Otto Warnloff noted that the use of the term "known test load" in paragraph N.1.1. should be consistently used in the proposed language instead of "test weights." A motion to withdraw this item from the Sector agenda was proposed by Otto Warnloff and seconded by Bob Feezor. During the subsequent discussion, several members of the Sector stated that the proposed language was unnecessary since there was no technical justification to change the current language in Handbook 44. Additionally, the proposed language would prohibit weights and measures officials from using ½ capacity even though the scale could be weighing loads up to ½ scale capacity that are not in the center of the platform. The NIST Technical Advisor stated that there was no technical reason to use procedures that are different than those in R 76. (Note: Manufacturers have stated in past discussion that they have to adjust the scales differently for scales intended for North America and scales intended for countries that adopt OIML recommendations).

Otto Warnloff stated that the current procedures for both shift test loads and positions in Handbook 44 are the same that were included in the 1915 Edition of the National Bureau of Standards Handbook titled "Tolerances and Specifications for Weights and Measures and Weighing and Measuring Devices." Page 19 of the handbook states:

> **COUNTER BALANCES AND SCALES.**
>
> 10. All scales shall be so constructed that when a weight whose body has approximately equal iameter and height and which represents one-half of the capacity of the scale, is shifted in any irection on the weight plate or on the commodity plate, pan, or scoop to a point one-half the distance etween the center and edge of the weight plate or the commodity plate, pan, or scoop, the additional esulting error in the weight indication, due to this cause alone, shall not exceed the tolerance allowed t the load in question given in the column headed "Tolerance on parts requiring employment of emovable weights": Provided, however, that in this test the edge of the weight shall not be made to roject over the edge of the weight plate or the commodity plate, pan, or scoop.

Measurement Canada reported that the proposal to amend Handbook 44 would be in conflict with their current requirements; however, they have stated in the past their commitment to align their requirements with OIML R 76.

Darrell Flocken (Mettler Toledo) reminded the Sector that the test load positions are also changed in the proposal and that ⅓ scale capacity in the proposed change puts a different torque in the load cell that is roughly equivalent to current forces when using current Handbook 44 test loads and positions.

**Recommendation: The Sector recommends that this item be withdrawn from the Sector agenda and that the Sector withdraws their support for the proposal to amend Handbook 44 shift test positions and test loads. The result of the vote on the motion was:**

- **11 votes *in favor of withdrawing* the item from the Sector agenda and reporting to the S&T Committee that the Sector no longer supports S&T Item 320-3.**

- **8 votes *against withdrawing* the item from the Sector agenda and reporting to the S&T Committee that the Sector no longer supports S&T Item 320-3.**

- **0 *abstentions*.**

## 4. Publication 14 Force Transducer (Load Cell) Family and Selection Criteria – Report of the Load Cell Work Group (WG)

**Source:** NTEP Committee Technical Advisor (Carryover Item)

**Background:** During the 2005 NTETC Weighing Sector Meeting Summary discussion of agenda Item 5, Publication 14 Force Transducer (Load Cell) Family and Selection Criteria, Stephen Patoray, NTEP Director, described a proposal that has been forwarded to the Load Cell WG. In summary, the proposal has the potential for an applicant to submit only one load cell for a basic load cell family to be covered on an NTEP CC. However, taking into consideration possible groups within the family (e.g., material construction, methods of mounting, strain gauge bonding, output rating, input impedance, supply voltage, cable details, etc.), there will be no significant difference in the number of load cells that have to be submitted for evaluation.

One of the questions that must be addressed in any proposed change to the selection criteria is how the criteria will affect applications to amend and expand existing Certificates of Conformance.

**Discussion:** NTEP director Stephen Patoray updated the Sector on the status of the project and provided a copy of the proposed family and selection procedures for Publication 14. See Appendix A – agenda Item 4 for a copy of the proposed language presented by the NTEP Director. He stated that there are only a few companies in the Sector that are affected by the proposed language and recommended that it be sent to other holders of NTEP CC for review. He further requested that any comments be submitted to him no later than December 1, 2006. He also confirmed that the proposed language is similar to the current OIML R 60 selection criteria and that what appears to be additional language is in fact improvements to parts of OIML R 60 that may be subject to different interpretations. He did add that the selection requirements are similar for typical families of load cells and that a small family of load cells may require an additional load cell to be submitted for NTEP because of the current policy of evaluating additional load cells with more than 5000 divisions.

In an e-mail, John Elengo stated that proposed language goes a long way towards alignment with OIML. He further agreed that the added language which clarifies language in OIML R 60 is an improvement and that it should be submitted for consideration during the next revision on the OIML recommendation.

**Recommendation: The Sector agrees with the suggestion for the NTEP Director to forward the proposal in Appendix A – agenda Item 4 to holders of NTEP CCs for review and comment by December 1, 2006. The comments will be summarized and if necessary the proposal will be amended and submitted to the NTEP Committee as a recommendation to incorporate them into NCWM Publication 14.**

## 5. Report of the Tare Work Group (Tare on a Multiple Range Scales)

**Source:** NTEP Participating Laboratories (Carryover Item):

**Background:** See the 2005 NTETC Weighing Sector Meeting Summary agenda Item 10, Tare on Multiple Range Scales, for additional background information on the earlier Sector discussions and WG developing items and recommendations.

During its 2005 meeting, the Sector voted 13 to 4 in favor of modifying Publication 14 to make tare rounding consistent with Handbook 44 General Code paragraph G-S.5.2.2.(c) Digital Indication and Representation for multi-interval and multiple range scales. The NIST technical advisor developed amendments to Publication 14 Sections 31, 32, and 45 to 51 for Tare and other possible sections that would consistently apply the rounding of tare throughout the digital electronic scales checklist. The Sector was to be balloted on the proposed modifications to Tare in Publication 14. The Sector also agreed to consider the OIML R 76 examples of tare rounding at a later date once the revision of R 76 has been completed.

During the development of the letter ballot language, it was noted that some items (e.g., tare annunciator and terminology) required further discussion by the Sector. Additionally, there is a developing (D) item in the 2006 NCWM S&T Agenda that may have an impact on the Sector recommendation. The NIST technical advisor

developed an alternate proposal that would address the operation of the "tare entered" annunciators, give examples demonstrating tare rounding in different scenarios, and add definitions clarifying the differences between semi-automatic tare and preset tare. Based on the concerns above, the NIST Technical Advisor did not believe that the language to amend Publication 14 was sufficiently developed to be submitted to the Sector as a letter ballot.

The NIST technical advisor consulted with the NCWM Chairman, Don Onwiler, NTEP Committee Chairman, Jim Truex, Sector Chairman, Darrell Flocken, and NTEP Director, Stephen Patoray, on both proposals to amend Publication 14 tare requirements. Because of the differing views and complexity of the issue, it was recommended that a small WG be established to review the proposals, review tare operation and requirements in general, and make recommendations on how tare is applied to single range, multiple range and multi-interval scale operation. The WG was specifically asked to develop a recommendation(s) for changes to Publication 14 (based on the Sector's 2005 recommendation), Handbook 44, and Handbook 130 (if necessary) and provide the Weighing Sector guidance on checklist requirements. It was anticipated that the group could perform the tasks though the use of e-mail correspondence and conference calls. The members of the WG are:

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|---|---|
| Scott Davidson, Chairman (Mettler Toledo) | Andrea Buie (Maryland NTEP Laboratory) |
| Jim Truex (Ohio NTEP Laboratory) | Todd Lucas (Ohio NTEP Laboratory) |
| Steve Cook (NIST Technical Advisor) | Stephen Patoray (NTEP Director) |

The WG, having met on five occasions through conference calls, developed a list of action items which is summarized below with the proposed amendments to Publication 14 Sections 31, 32, and 45 to 51 based on the recommendation in the 2005 Weighing Sector Summary for agenda Item 10. A full copy of the report of the Tare WG, including the status of the action items, can be found in Appendix C – Attachment to Item 5.

1. Amend Publication 14 Sections 31, 32, and 45 to 51.
2. Discuss a request that the S&T Committee revisit the 1980 discussion.
3. Propose adding definitions of "Tare" and "Preset tare" to Handbook 44.
4. Propose adding a definition of "net" based on Handbook 130.
5. Propose adding requirements for "Tare" and "Preset tare" to Handbook 44.
6. Propose adding indication and printing requirements for tare values to Handbook 44.
7. Propose adding a tolerance for scale accuracy in the net mode to Handbook 44.
8. Consider the OIML allowance for 1e deviation of (calculated) indicated and printed net weights due to the rounding of tare.
9. Propose amending Scales Code paragraph S.1.2.1. to clarify that indicated and printed net weights calculated from gross and tare weights on multi-interval scales, multiple range scales, and weights determined from two different scales may have an apparent interval other than 0, 1, 2, or 5.
10. Agree on a position that paper/plastic zeroed off by an automatic zero-tracking mechanism (AZT) be interpreted as net weight without a net or tare indication based on the definition of net in Handbook 130 (e.g., When a bag or paper is placed on the scale it is balanced off by the AZT mechanism. The product is then added to the scale without removing the tare material).
11. Discuss recommending policy on tare less than 0.5 e for:
    - Single range scales, and/or
    - Multi-interval and multiple range scales.

    Alternatively discuss recommending suitability criteria and minimum number of tare intervals. (e.g., 2 e for single range scales and 5 $e_1$ for multi-interval and multiple range scales)
12. Discuss and develop a position on Southern Weights and Measures Association (SWMA) Developing S&T agenda Item 360-4 Part 2, Item 1 Scales: S.2.1.7. Tare Rounding on a Multiple Range Scale.

**Discussion:** The Sector reviewed and discussed Action Item 1 to amend Publication 14 Sections 31 and 32. Additionally, the Sector reviewed the remaining action items and the status of the "Tare" WG. The NIST technical advisor stated many of the proposed definitions in Appendix D; proposed amendments to the Scales Code paragraphs S.1.1.1. Digital Indicating Elements, S.1.2.1. Weight Units, and T.N.2.1. General and AWS Code paragraphs S.1.2. Value of Division Units and T.2.1. General, were sufficiently developed and could be submitted to the NCWM S&T Committee through SWMA for consideration.

**Recommendation: The Sector recommends that the amendments to Publication 14 Sections 31 to 32 and 45 to 51 in Appendix A – agenda Item 5 be submitted to the NTEP Committee for approval. The Sector further recommended that the NIST Technical Advisor submit to the SWMA S&T Committee the Tare WG recommendations that propose:**

- **Adding new and amended definitions to facilitate a uniform understanding of the terms already used in Handbook 44 (e.g., "tare mechanism," "tare," "net," etc.) in Handbook Appendix D – Definitions;**
- **Amending Scales Code and AWS Code paragraph S.1.1.1. Digital Indicating Elements. Clarifying that a scale can display a "center-of-zero" indication with a load on the platform provided it has been balanced off by a tare mechanism while the scale is in the net mode of operation,**
- **Amending Scales Code paragraph S.2.2.1. Weight Units. and AWS Code paragraph S.2.1. Value of Division Units. by adding a note that permits calculated net weights from multi-interval and multiple range scales to be in units other than 0, 1, 2, and 5 in order to maintain the accuracy of tare weights when the gross weights are in a weighing range with a larger scale division, and**
- **Amending Scales Code tolerance paragraph T.N.2.1. General and AWS Codes paragraph T.2.1. General to clarify that tolerances are also applied to net weight indications from a net indication of zero using any possible tare load.**

**Copies of the proposals submitted to SWMA are included in Appendix C – Attachment to Item 5.**

## 6. Minimum Size of Weight and Units Indications

**Source:** New York NTEP Participating Laboratory (Carryover Item)

**Background:** See the 2006 NCWM Specifications and Tolerance Committee Final Report on Item 320-2 for additional background information.

This proposal was originally developed to address a growing problem with the readability of weight indications and the values that define transaction information. Field and laboratory officials indicate that both are becoming increasingly smaller, as demonstrated in the following example of a weight display where the actual size of the weight values are 23 mm in height, but the unit of measurement (g) is 4 mm in height.

During its 2005 meeting, the Sector agreed that any proposal to specify the height of the weight display and units indications in NIST Handbook 44 should be limited to the Scales Code and should align with OIML R 76 to the extent possible. The size requirements should be limited to weight indications visible to the customer in direct sale applications; the weight display should be no smaller than 9.5 mm; and the units display or marking should be no smaller that 2 mm.

**Discussion:** The Weighing Sector reviewed the background information and the original proposal. Many of the public Sector members believed the 2 mm height specification for the units of measures was too small. Other Sector members commented that the language, while permitting larger display heights for the weight, would still allow a 2 mm display of the units. For example, a scoreboard display with a 155 mm (6 in) weight display could still have a unit display of 2 mm (¼ in). Otto Warnloff stated that the proposed language is not needed since Handbook 44 General Code paragraph G-S.5.1. General (Indicating and Recording Elements) states the primary indicating indications shall be clear, definite, and easily read under any conditions of normal use. The Sector discussed a recommendation to state that the minimum units display height shall be related to the height of the weight display similar to the relationship between the display height and the unit of measure height as specified in Handbook 44 Taximeter Code paragraph S.1.3.1. Minimum Height of Figures, Words, and Symbols which states:

> **S.1.3.1. Minimum Height of Figures, Words, and Symbols.** The minimum height of the figures used to indicate the fare shall be 10 mm and for extras, 8 mm. The minimum height of the figures, words, or symbols used for other indications, including those used to identify or define, shall be 3.5 mm.

It was recognized that the ratio of the 3.5 mm requirement for figures, words, and symbols to the 10 mm for indication of the fare equates to 35 %. The Sector supported the concept of specifying a ratio for this relationship of the weight display and the "units" indication and discussed what might be an appropriate limit. The current language in the proposal would equate to a 21 % relationship. Some public Sector members believed that the ratio should be 60 %. The manufacturers stated that they could not suggest a current relationship at this time since they need to check with their suppliers and verify available sizes and display specifications.

The NTEP Director, Stephen Patoray, suggested that the Sector not discuss or comment on the proposed user requirements at this time since NTEP typically does not evaluate user requirements during type evaluation.

**Recommendation: The Sector did not reach a consensus on where to set the minimum height of the units. However, the Sector still supports the proposed specifications and recommends that the minimum height of the units indication be stated as a percentage of the height of the weight display. The NIST technical advisor amended the proposed language to state that the minimum height of the units display be written in terms of as a percentage ratio (starting at 21 %) of the height of the weight display as shown below. The percentage may be changed based on research and input from manufacturers prior the January 2007 NCWM Interim Meeting.**

***S.1.4.6. Height. - All primary indications shall be indicated clearly and simultaneously.***

***(a) On digital devices that display primary indications during direct sales to the customer, the numerical figures displayed to the customer shall be at least 9.5 mm (0.4 in) high.***

***(b) The units of mass and other descriptive markings or indications, such as lb, kg, gross, tare, net, etc., shall be clearly and easily read and shall be at least 21 % on the height of the primary weight indications.***

***[Nonretroactive as of January 1, 2007]***
***(Added 200X)***

**The Sector did not have sufficient time at the end of its meeting to discuss and provide recommendations to the S&T Committee on the proposed user requirements for "Minimum Reading Distance" and "Primary Indicating Elements Provided By The User" and the definition for minimum reading distance.**

## 7. AWS Influence Factor Temperature Ranges that Exceed -10 °C to 40 °C

**Source:** Ohio NTEP Participating Laboratory. (Carryover Item)

**Background:** See the 1991 and 1999 NCWM S&T Committee Reports and the 2005 NTETC Weighing Sector Meeting Summary agenda Item 18 for additional background information.

Juana Williams (NIST), Steve Cook (NIST), and Darrell Flocken (Mettler Toledo) agreed to develop a summary paragraph, with points that need to be addressed (e.g., temperature testing at the time of the NTEP evaluation vs. ambient temperature during subsequent verifications and the marked temperature range).

During the research of this item for the summary paragraph, NIST WMD discovered that the technical policy recommended by the 2005 Weighing Sector conflicts with the position of the 1991 S&T Committee Item 320-3 (I) S.6.3. Marking Requirements; Temperature Range that states:

> **"If a device is marked with a temperature range greater than 14 °F to 104 °F, then the device is tested over the wider range during type evaluation."**

**Discussion:** The Sector reviewed the background information provided in the agenda and considered the following two parts regarding:

Part 1. Developing a recommendation for the NCWM S&T Committee to amend the temperature requirements in the Belt-Conveyor Scale Systems, Automatic Bulk-Weighing Systems, AWS, Multiple Dimension

Measuring Devices, and Grain Moisture Meter (GMM) codes to be similar to the following Scales Code paragraphs T.N.8.1.4. and Table S.6.3.b.

The Sector noted that any proposal to amend the AWS, Belt-Conveyor Scale Systems, and Grain Codes should be submitted to the appropriate Sectors.

Part 2. Developing and recommending a technical policy to address the 1991 S&T position for devices submitted with a temperature range where the minimum and/or maximum temperature exceeds the limit specified in Scales Code paragraph T.N.8.1. Temperature.

Many Sector members reiterated their concerns that the larger temperature ranges listed on the NTEP CC may infer higher quality devices and that applicants would consider submitting these devices in order to gain a potential marketing advantage. The NTEP laboratories were concerned that testing devices to the wider temperature ranges could be a potential safety issue when the evaluator has to spend a significant amount of time in their environmental chamber while devices are tested at the temperature extremes. Additionally, not all the laboratories have environmental chambers that are rated or capable of operating with the larger temperature ranges. The Sector believes that this will result in one or two laboratories receiving the majority of NTEP applications requesting temperature testing using the larger temperature ranges.

The NTEP Director noted that the current language in Handbook 44 Scales Code Table S.6.3.b. Note 5 states that the temperature range marking on the device is only required if ***"the temperature range stated on the CC is narrower than and within"*** the standard temperature range. Don Onwiler added that a higher range marked on the device would not be supported or covered by the NTEP CC if the CC listed that standard range.

The Sector briefly discussed the possibility of utilizing the provision in the NTEP Administrative Policy to allow "Provisional" NTEP CCs on devices where NTEP evaluated with the larger temperature range submitted by the applicant. This was not recommended because of concerns that the larger temperature range issue may be used as a marketing issue inferring that it is a better quality device.

***Recommendation for Part 1*: The NIST Technical Advisor will prepare a proposal to SWMA to amend the AWS Code Table S.7.b. Note for Table S.7.a. to align Note 5 with the Scales Code for only the AWS Code. The Sector agreed that the other codes listed by the NIST Technical Advisor need further evaluation by the appropriate NTETC Sector. A copy of the proposal to amend the AWS Code is in Appendix C – Attachment to Item 7.**

***Recommendation for Part 2*: The Sector believes that the technical policy defining the scope of temperature testing conducted by NTEP that was adopted by the 2005 Weighing Sector is not in conflict with the 1991 S&T Committee since the 1999 revision to Scale Code Table S.6.3.b. amended Note 5 by linking the temperature range marking requirement to the range listed on the CC. The Sector also believes the CC would not cover devices that are marked with a larger temperatures range than what is listed on the CC. For example, an NTEP CC that lists a temperature range of –5 °C to +30 °C would not cover a device that was not marked with a temperature range, or marked with a –5 °C to +45 °C temperature range.**

**The Sector agrees with the concerns from the NTEP laboratories that testing over larger and larger temperature ranges may become a health and safety issue and that existing temperature chambers are limited in their capabilities to perform temperature tests over wider ranges.**

**Additionally, the Sector asks that the NCWM S&T Committee review and amend the Committee's 1991 position considering changes to the marking requirements, health and safety concerns, and limitations of NTEP laboratory testing equipment.**

## New Items

## 8. GIPSA Grain Test Scale Requirements

**Source:** GIPSA and the NTEP Committee

**Background:** GIPSA is responsible for approval of equipment used to inspect grain under the USDA official system. GIPSA has reviewed the NTEP requirements for official grain test scales in an effort to simplify and harmonize with NTEP requirements for commercial grain test scales.

GIPSA, in consultation with the American Association of Grain Inspection and Weighing Agencies, Ohaus, Mettler Toledo, and Seedburo Equipment Company, revised its rules for official grain test scales and user requirements in the GIPSA Equipment Handbook Chapter 2, Grain Test Scales (page 6) effective February 2002. This can viewed at the USDA web site using the following internet address: http://archive.gipsa.usda.gov/reference-library/handbooks/equipment/eq2-scal.pdf

GISPA submitted recommended amendments for NCWM Publication 14 DES Section 37. Grain Test Scales to the Sector in order to align Publication 14 with their requirements for the suitability of scales used to weigh grain samples.

**Discussion:** The Sector reviewed the proposed amendments submitted by GIPSA and discussed the following to clarify information requested by GISPA in order for an NTEP Certified Grain Test Scale to be used in GISPA supervised applications:

- GISPA reviews a scale's parameters, such as accuracy class, capacity, and "e" or "d" before a scale can be used in a GISPA supervised application. In other words, a suitable scale may be used even if it does not have all the features of a grain test scale as defined in Handbook 44 Appendix D and grain associated calculations (i.e., bushel weight) are not required to be part of the scale.
- Scale manufacturers reported that the availability of suitable scales has improved since the requirements for grain test scales were first revised in the GIPSA Equipment Handbook.
- The GIPSA classifications for "Precision," "Moisture," and "General" are no longer used when applying scales suitability requirements on scales marked with an accuracy class. GIPSA currently determines suitability based on the intended loads called a "Work Portion" in the proposed amendments to Publication 14, and the values of "d" and if applicable "e" for Class II and Class III NTEP certified scales.
- DRAFT NTEP CCs with references to GIPSA shall be submitted to GIPSA for review and comment.
- The "Work Portion" column in the proposed is the range of weights for particular grain samples. Grain samples within a range specified the proposed table must meet the requirements for "d." This can be accomplished by using scales with expanded resolution, multi-interval and multiple range scales, a precision scale scales that covers the anticipated sample weights, or by using more than one scale.
- The GIPSA requirement permits the use of "d" when "d" is smaller than "e."

There were additional discussions about the suitability of Class II or III grain test scales used for other Class II or III applications such as gem and jewelry weighing. Sector members stated that the current Class II or III scales intended for either application are able to be configured to be suitable for direct sale commercial weighing by disabling the grain associated features or making "e" equal to "d" and that the use of grain test scales in other non grain weighing applications is not within the scope of NTEP.

**Recommendation: The Sector made some editorial changes to the proposal and recommends that the amended proposed changes in Appendix A – agenda Item 8 be incorporated into Publication 14.**

## 9. *Ad Hoc* Procedures for Wireless Communication of Metrological Information

**Source*:* NTEP Laboratories**

**Background:** NTEP has received several inquiries about the suitability of scales with wireless communication capability between the W/LRE and the indicating element (and recording element, if applicable). Several NTEP applicants had this feature reviewed, evaluated, and listed on their CCs according to NTEP Technical Policy in Publication 14 Section A that states that "All options and features to be included on the CC must be submitted for evaluation. Nonmetrological features may be listed on a CC, but only if the feature has been evaluated and operates as intended." Other holders of NTEP CCs did not have the feature evaluated and listed on the CC. Because of this discussion, it was noted that there are no specific procedures in Publication 14 and that the participating laboratories were evaluating this feature based on interpretations of language in Publication 14 Section 11. Indicating and Recording Elements - General. Therefore, the Participating Laboratories developed ***ad hoc*** procedures specifically for weighing devices using wireless communication to transmit weight values between the load-receiving element and a receiver (i.e., indicating element and/or printing element).

The Sector was asked to:

1. Review and recommend the proposed ***ad hoc*** language in the agenda be added to Publication 14 Section 11. Indicating and Recording Elements – General; and

2. Discuss installations where scale owners or third parties are adding wireless communication capability to weighing equipment that already has an NTEP CC, and whether or not additional NTEP policies or procedures are needed to address this type of modification.

**Part 1 Discussion/Recommendation: The Sector made several editorial suggestions for formatting and clarification to the proposed *ad hoc* procedures. The Sector agreed that the *ad hoc* procedures in the agenda are sufficiently developed and recommends that the proposed amended *ad hoc* procedures in Appendix A – agenda Item 9 be incorporated into Publication 14.**

**Part 2 Discussion/Recommendation: The Sector discussed several scenarios where a device owner or third party replaces cables between the various weighing/load-receiving, indicating, and recording elements, and if the original device would still be traceable to the NTEP CC for the device. The Sector Chairman, Darrell Flocken, asked the Sector about the following scenario.**

> **Does the NTEP CC still cover an NTEP certified scale with a third party wireless printer on a scale that was originally evaluated with a cable between the scale (printer output) and a printer or a remote display that was not used as the primary indictor (i.e., a transmitter would be installed on the scale and a receiver would be installed on the printer or slave display)?**

**Many of the Sector members believed that this would be a non-metrological modification to the device since the NTEP CC does not state that the "printer output" feature is limited to printers that are physically connected to the device. Therefore, the CC would still apply to installations with printer outputs that have already been evaluated by NTEP where the printer cable is replaced by a wireless communication device. Although the dumb printers and auxiliary displays should not be subject to NTEP evaluation, they are typically verified for agreement of indications during normal inspections. Other Sector members disagreed and stated that this would not be covered by the NTEP CC since it needs to be verified that there is no metrological effect on the measurement when metrological information is sent to the printer via the wireless communication.**

- **The Sector agreed that the devices would no longer be traceable to the NTEP CC when wireless communication is added between metrological elements and is not listed on the NTEP CC.**
- **The Sector also recommended that the discussion on wireless communication between a metrological element and a non-metrological element be carried over as an item to be further developed and discussed for the 2007 meeting of the Sector.**

## 10. Procedures for Percentage and Proportional Tare

**Source:** NTEP Laboratories

**Background:** During the April 2000 NTEP Participating Laboratories Technical Session, the weighing devices laboratories discussed the use of percentage and proportional tare. A WG was formed to develop proposed additions to Publication 14. The 2000 WG developed the following definitions and type evaluation procedures for consideration by the Sector in order to facilitate a consistent understanding of the terms used in the proposals. However, the proposals did not get placed on the 2001 Weighing Sector Agenda:

**Discussion:** The Sector reviewed proposed definitions and Draft Publication 14 type evaluation procedures. A few of the Sector members stated that the terms "proportional tare" and "percentage tare" are not in Handbook 44, and therefore, the proposed type evaluation procedures should not be used in Publication 14. The NTEP Director stated that evaluations of percentage tare are currently being conducted by the NTEP laboratories and that procedures need to be included in Publication 14. Andrea Buie, Maryland, stated that the procedures and definitions are consistent with those used by Measurement Canada and that NTEP uses those procedures for U.S./Canada mutual recognition type evaluations.

**Recommendation: The Sector believes that it needs additional time to study the proposed language developed by the NTEP laboratories and recommends that the proposed Publication 14 language be submitted to the Sector as a ballot item prior to the January 2007 NCWM Interim Meeting.**

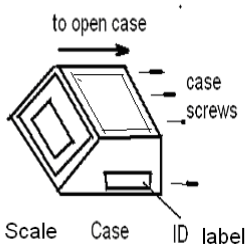
**The Sector voted nine to zero to approve and recommend that the 2000 WG proposal in Appendix A - Agenda Item 10 to evaluate weighing devices with percentage and proportional tare be included in NCWM Publication 14.**

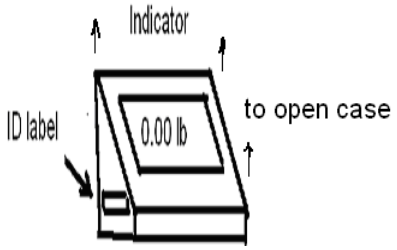
## 11. Permanence of Identification When an Audit Trail is the "Security Means"

**Source:** New York NTEP Laboratory

**Background:** The New York NTEP Laboratory has stated that audit trails may not always be the appropriate method of sealing for a scale or indicator to ensure permanence of the identification information. This is true if the identification information marked on the device is on a removable part of the weighing (or measuring) device such as a cover or outer case. The identification information marked on the device should not be considered "permanent" according to NIST Handbook 44 paragraph G-S.3. Permanence if it is on a removable part of the device unless the cover can be physically sealed to an integral part of the scale.

1. If an audit trail is the means of sealing, then the outer case or cover containing the identification information can be removed and replaced with that of another scale or indicator, making the information not permanent. This is true of some scales with physical seals where the security seal is located on a cover that is not on an integral part of the scale.




2. If an audit trail is the approved method of sealing for this case, the case base containing the ID plate can be switched with the ID plate on another case.

The New York NTEP Laboratory recommends that a scale with the identification located on an easily removed cover and electronic means of sealing still should have a physical security means to seal the cover to an integral part of the scale.

The NIST Technical Advisor provided the Sector additional information on this subject from the June 1989 Weighing Sector NTETC-Weighing Sector meeting discussions on agenda Item 4 regarding identification information located on a removable part of a scale, such as a cover. During that meeting, the Sector recommended that:

> ". . . the fraud aspects of manipulating identification badges were not valid. Many other possibilities exist for fraud and are easier to perpetrate if someone chooses to do so. Tampering was not considered significant relative to the marking requirement. The consensus of the Committee was that "permanent" should mean that the identification information must be sufficiently durable to withstand normal wear and tear throughout the life of the device. An identification badge must be difficult to remove. Blind rivets to attach a badge to a device are acceptable, but removable screws are not...
>
> "The Committee concluded that the sentence (*It may be installed on a removable cover if the cover can be fitted with a security seal.*) in the second paragraph on page 69 of NCWM Publication 14 (1989) shall be deleted."

**Discussion:** The Sector reviewed the background information and discussed whether there is sufficient justification for this subject to be revisited. During the discussions, the New York and Maryland participating laboratories stated that sealing a cover to the base of the scale is a deterrent and is intended to indicated that a security seal that has been broken or removed from the scale indicates that something has happened to the device. Maryland stated that they have experienced a situation where a cover (and the identification information) was removed from a rejected scale and placed on a sealed scale thereby inferring that the rejected scale was corrected.

Other Sector members agreed with the 1989 Sector discussions that the fraud aspects of manipulating identification badges were not valid. Many other possibilities exist for fraud and are easier to perpetrate if someone chooses to do so. Tampering was not considered significant relative to the marking requirement.

The New York laboratory suggested that the serial number of the scale could be made part of the electronic method of sealing and available in a similar fashion as other forms of audit trails. The manufacturers stated that adding serial numbers to event counters and event loggers would add a significant cost to the scale since the audit trail components would require unique programming for every scale.

The NTEP Director, Stephen Patoray, commented that the identification information and serial number are currently not considered sealable parameters and do not fall within the "Philosophy for Sealing" in Publication 14. He also suggested that the Sector consider developing language similar to Handbook 44 Liquid-Measuring Devices Code paragraph S.4.4.2. Location of Marking Information; Retail Motor-Fuel Dispensers that requires the identification

information on a portion of the device that cannot be readily removed or interchanged and allows the information be located internally provided there is easy access through the use of a key or tool. However, the words "easily" and "readily" used in the referenced LMD code paragraph are too subjective. The manufacturers responded that there is no part of a computing scale that is not removable and added that the platter support is an integral part of a scale which can be removed with two screws.

**Recommendation: The Sector did not reach a consensus on this item and stated that there was no proposed language to be reviewed in order for the Sector to comment on a proposal to amend Handbook 44 or Publication 14. The New York laboratory was requested to consider the comments made during the discussion and if they still believe that there is sufficient justification, develop a specific proposal to be considered by the Sector or the S&T Committee.**

## 12. $e_{min}$ and Other Markings on Load-Receiving Elements

**Source:** California NTEP Laboratory

**Background:** The California NTEP Laboratory has reported that applicants are using incorrect abbreviations for minimum verification scale interval, maximum number of scale division, and load cell verification interval that are used in NIST Handbook 44 Scales Code Table S.6.3.a. and in the applicable definitions in Appendix D. That is, the applicants are using the letters in both upper and lower text cases and without the appropriate subscript. The incorrect case and lack of the subscript "min" or "max" completely changes the definition of the symbol or abbreviation. For example, a lower can "n" by itself indicates the number of divisions configured for a specific instrument and not the maximum number of divisions ($n_{max}$) and an uppercase "E" is a symbol used for load cells to define the dead load of a load cell in a specific instrument.

**Discussion/Recommendation:** The Sector considered a proposal to amend NCWM Publication 14 Section 4. Additional Marking Requirements – W/LREs and Section 76. List of Acceptable Abbreviations/Symbols. The NIST technical advisor suggested that the Sector may want to review other sections of Publication 14 for other symbols and abbreviations that are not permitted in Handbook 44 such as markings for load cells and separable indicating elements and clearly state that "Class IV" is or is not an acceptable Marking for Class IIII instruments.

The Sector recommends that the proposed amendments in Appendix A – agenda Item 12 be added to Publication 14 DES Sections 4 and 76. Additionally, the Sector recommends that the proposed amendments to Section 76 be added to the "List of Acceptable Abbreviations/Symbols" that was adopted by the 2006 NCWM during its 91st Annual Meeting.

## Railway Track Scale Items

## 13. CLC Type Evaluation Tests on Railway Track/Vehicle Scales – Technical Policy

**Source:** Brechbuhler Scales Inc. (Carryover Item)

**Background:** During its 2005 meeting, the NTETC Weighing Sector agreed that NCWM Publication 14 Technical Policies and Test Criteria for vehicle scales and railway track scales should be reviewed and that separate test criteria should be developed for combination vehicle/railway track scales. The new criteria should include technical policies and test procedures for:

1. New NTEP applications,
2. Amendments to existing Certificates of Conformance (CCs) for railway track scales to include the vehicle weighing feature including:
   a. CLC ratings,
   b. CLC testing using field standard weights (center vs. off-center),
   c. Permanence tests, and
3. Tests using the vehicle scale $e_{min}$ for new NTEP applications and existing CCs.

Ed Luthy developed a draft proposal and distributed it for review and comment to Stephen Langford, Darrell Flocken, and Bob Feezor prior to it being placed on the Sector agenda.

**Discussion:** The Sector reviewed the proposed amendment to Publication 14 technical policies in Section 8.e., and made some editorial suggestions to the proposed language in Appendix A – Attachment to Item 13, and recommends that it be incorporated into Publication 14 Section 8.e.

The NTEP Director, Stephen Patoray, noted that the proposed amendment to Section 8.e. applies only to devices submitted for evaluation and could not be applied to previous evaluations without additional testing as it is currently worded. The Sector discussed the impact of the proposal to accept a vehicle scale application on an existing NTEP CC for railway track scales.

Some of the Sector members commented that vehicles are wider than the width of the rails and that they may travel along one side of the scale or the other; consequently, it may not be appropriate to include vehicle weighing applications without additional testing since the evaluation of the railway track scale applies test loads directly on the rail and cannot be conducted side-to-side. *(**NOTE:** Side to side testing is not required for an evaluation of a single platform vehicle scale that is less than 14 ft wide)*. Additionally, it was noted that Publication 14 Section 69.5 Increasing Load and Section Test does not specifically state that sections are to be tested up to 100 000 lb although it is implied.

The NTEP Director asked the Sector to confirm that railway track scale section and strain load tests were similar to and had the same impact as vehicle scale evaluations. The Sector stated that the tests are equivalent although the language in Section 69. Performance and Permanence Tests for Railway Track Scales Used to Weigh Statically is not the same as Section 66.a. Performance and Permanence Tests for "Single Load-Receiving Element" Legal for Highway Vehicle Scales and Permanently-Installed Axle-Load Weighing Elements.

The NTEP Director suggested and the Sector agreed that Publication 14 Section E. Modification of Type could be amended to update existing railway track scale CCs to include vehicle-weighing applications without additional testing if:

- the section test on the railway track scale was performed with 100 000 lb of certified test weights or weight carts;
- strain load tests were conducted during the original railway track scale evaluation;
- the design of the load-receiving element is no wider than 12 ft; and
- the design of the weighing element is "beam and girder" design (this would not be applicable to other scale designs such as composite designs where the strength of the deck is dependent on several individual elements being combined in the design of the scale deck). (See SAP suggestions)

**Recommendation: The Sector recommends that Section 8.e. as amended by the Sector in Appendix A – Attachment to Item 13 be incorporated into Publication 14 Section 8.e.**

**The Sector also recommends that specific language for Publication 14 Section E. Modifications be developed as a carryover item based on the above discussion. Stephen Patoray, Todd Lucas and Steve Beitzel agreed to review Section E and develop language to be considered by the Sector during its 2007 Annual Meeting.**

## 14. Railway Track Scales with a Rotary Dump Feature Technical Policy

**Source:** Bob Feezor, Norfolk Southern Corporation (Carryover Item)

**Background:** The following is from the 2005 Annual Meeting of the NTETC Weighing Sector, agenda Item 19 which included a discussion and recommendation on the lack of documentation and test procedures for railway track scales with the rotary dump feature that facilitates emptying loose bulk material (e.g., coal) from a railway car while still on the load-receiving element.

Manufacturers of rotary dump mechanisms for railway track cars offer a weighing option where a railway track scale is built into, or installed in the rotary dump mechanism. The manufacturers of these systems frequently believe that the railway track scale is approved for this application (or in some cases, just the load cells and indication elements), and is covered by an NTEP CC. Additionally, there are many existing rotary dump mechanisms that were installed prior to the formation of NTEP that are nearing the end of their useful life, and the users of these devices are requesting that the railway track scales be covered by NTEP CCs. The submitter of this item is concerned there are no documented policies and test criteria for these devices, and therefore promotes inconsistent enforcement of the NTEP requirements on these devices.

NTEP and the laboratories have consistently stated that a railway track scale CC must include the rotary dump mechanism and must be verified by NTEP and subsequently listed on the CC. The problem is that this policy is not documented in NCWM Publication 14, nor are there any documented procedures to test the rotary dump scales.

Robert Feezor recommended that *ad hoc* policies and test criteria should be developed to add the rotary dump mechanism as a feature on the.

**Recommendation:** The Sector agreed with the submitter that the rotary dump option should be included on CCs for railway track scales, and that NTEP Technical Policies and test criteria are needed for Publication 14. Robert Feezor and Steve Cook agreed to draft technical policies and test criteria will be developed and submitted for the 2006 meetings of the NTEP Labs and Weighing Sector.

Bob Feezor and William Bates (GIPSA) submitted a test form and procedures for testing railway track scales with a "rotary dump" feature.

The NIST Technical Advisor recommended that the "Railway Track Scale Rotary Unloading (Dump)" feature be added to the "Features and Options - Characteristics of Each Model(s)/Type(s) or Sub-Group(s)" section of the NTEP application for scales.

**Discussion/Recommendation: The Weighing Sector reviewed the proposed amendment to Section E. Modification of Type and recommends that Section E, as amended by the Sector in Appendix A – Attachment to Item 14, be incorporated into NCWM Publication 14.**

## 15. In-Motion Railway Track Scale Technical Policy – Developing Item

**Source:** NTEP Director

**15(a). Permanence Test for Indicators/Controllers (Note:** This was listed as agenda Item 15 (b) in the original agenda.)

**Background:** During recent months, there has been extensive discussion by the NTEP Committee, the NTEP Director, and several NTEP CC holders regarding this device type. The question has been raised as to the necessity of a permanence test, or more appropriately, the value of a permanence test, for this device type.

The current Section 68 appears to be written to evaluate an entire system, including a previously NTEP-certified W/LRE and NTEP-certified indicating element.

It has been suggested that the CIM device is actually an electronic device that is software-based, which in many cases, is added onto the existing indicating element. It has been further suggested that other electronic devices such as separable indicating elements or POS systems are not required to be subjected to a permanence test in Publication 14. So the question is raised: Should this type of device be required to go through a permanence test when both the W/LRE and indicating element already have an NTEP CC and the W/LRE has already gone through a permanence test?

Discussions on the permanence requirements for the W/LRE indicate that the method of loading does not change with this type of device whether it is a static or a CIM device. The rail car must still travel on the rail over the scale.

However, arguments against the above position indicate that the CIM device is subject to other factors that 1) can only be evaluated as an actual system; 2) cannot be simulated in the laboratory; and 3) must be subjected to some type of actual performance tests and permanence tests to determine if the device can gather and perform the necessary calculations to estimate the weight of both the individual cars and the unit train. Other factors may include, but are not limited to, something in the W/LRE "working loose" in the time between the initial performance test and the permanence test causing additional vibrations that would not effect static weighing, but would have an impact on the software's ability to determine a weight while the railway car is in motion.

In summary, questions that need to be addressed are:

1. Should an in-motion type of device be required to go through a permanence test when the W/LRE is covered by an NTEP CC and has already been tested for permanence for static weighing applications?

2. Should there be different permanence test requirements for W/LRE that are evaluated for static or CIM weighing applications?

3. Should there be different permanence test requirements for CIM or uncoupled in-motion weighing applications?

Additionally, it may be necessary to review the entire Section 68 to clarify several sections applicable to the in-motion indicators and controllers that are not currently clear (e.g., the three sentences before the recording Data table on page DES 113 in the *Actual In-Motion Test* paragraph that state that the system is to be tested under normal operating conditions and then specifies tests that are outside of the normal operation conditions).

Jim Truex submitted the following comments in an e-mail to Stephen Patoray dated September 9, 2006:

> As you are aware, the NTEP Committee ruled on an issue pertaining to the need for a permanence test on a CIM railway system controller. Section 68 of Publication 14, in present form, appears to require a full permanence test (initial and follow-up). The decision by the NTEP Committee was that a full permanence test was not necessary. A one time test, if the controller passed, would be sufficient. In effect, the decision was an ***ad hoc*** type decision as it needs to be addressed and "red stamped" by the NTETC Weighing Sector. Ohio NTEP laboratory personnel discussed the issue and provided input prior to the decision of the NTEP Committee. The Ohio NTEP laboratory agrees with the decision of the NTEP Committee and is recommending a change to Publication 14 to reflect the decision of the NTEP Committee. The following represents our position and rationale.
>
> 1. The manufacturer is requesting an evaluation and CC for the controller only. If the request was for a complete railway system CC, a permanence test would be necessary.
>
> 2. If the manufacturer was requesting to have their CC for the weighing element amended to cover in-motion weighing, a permanence test would be necessary. It is our understanding that a CC will only be issued for the controller upon successful completion of the evaluation. NTEP does not perform permanence tests on scale indicators and controllers (e.g., hopper scale controllers, vehicle scale controllers/weigh-in & weigh-out system controllers, cash registers, etc.) in the laboratory.
>
> 3. Yes, in this case we are evaluating and testing a system, as necessary to evaluate the performance of the controller in the system, but in this case, we are only issuing a CC for the controller. We do not perform permanence tests on electronics.
>
> 4. What purpose would the permanence test serve? If the system fails the permanence test, but we determine the system failed because a load cell went haywire, what would be our rationale for failing the controller and refusing to issue a CC?

5. It goes without saying Publication 14 needs to be addressed and clarified. It is appropriate to direct any changes to Publication 14 through the appropriate Sector – in this case the Weighing Sector.

**Discussion:** The NTEP Director provided the Sector with additional background information stating that this item arose from an appeal from a manufacturer to the NTEP Committee regarding permanence testing for a coupled in-motion indicator/controller. The NTEP Committee stated that permanence testing was not needed for the "controller electronics and software." As a result, other manufacturers and the railroads believed that it was an incorrect decision.

Steven Beitzel, Systems Associates provided the Sector with their justification as to why permanence testing is required on both the weighbridge and electronics. He indicated that NTEP Publication 14 Section 68. Performance and Permanence Tests for Railway Track scales Used to Weigh-In-Motion clearly states that a permanence test shall be performed. To issue a certificate with the knowledge that required testing had not been performed cannot be allowed. There can be only one interpretation of the word "shall" under the permanence-testing requirement in the "Permanence Test" paragraph of the procedure.

With regards to modifying the test procedure, Steven Beitzel added that the permanence testing cannot be eliminated. The weight-processing unit of an in-motion railcar weighing system uses a set of filters or algorithms to differentiate the railcar's weight from the extraneous information from the load cell data being generated as the railcar passes over the weigh rail. These algorithms are trade secrets and confidential and not open for evaluation except by performance and permanence testing. These algorithms must determine the true weight while filtering out the erroneous signals generated by impacts of steel wheels on steel rail. As the nature of the "noise" generated by the railcar traffic changes with use of the weighing system and the cars being tested, the follow up test is critical to insure the system can continue to differentiate the actual weight with a system that has seen the effects of time and traffic. This permanence test cannot be eliminated.

Many of the railroads support permanence testing for controllers since Publication 14 Section 68 is intended for the system regardless if the W/LRE has already passed a permanence test and they question the waiving of the requirements without receiving input from the Sector.

Other Sector members stated that many of the arguments presented by Steve Beitzel and the railroads in the previous paragraph are legitimate concerns but that they are mechanical influences of the various part of the track and are installation-related, and not related to the controller electronics and software. NTEP has several examples where permanence testing is waived for electronics and software and that permanence testing is limited to the mechanical portion of a weighing system.

The NTEP Director stated that the comments made by the Sector are all good points, but the language in Section 68 is unclear as to what constitutes a permanence test. Is it intended to evaluate the permanence of the installation?

Otto Warnloff added that permanence testing is based on Handbook 44 General Code paragraph G-S.3. Permanence. which states that **all equipment** shall be of such materials, design, and construction as to make it probable that, under normal service conditions, accuracy will be maintained, operating parts will continue to function as intended, and adjustments will remain reasonably permanent. Prior to the establishment of NTEP, NBS (now NIST) Report of Tests for all weighing and measuring devices clearly stated that the report did not verify permanence.

Stephen Langford added that the results of permanence testing reflect a device's ability to maintain its accuracy over a period of time established by NTEP. Electronic elements historically demonstrated that permanence testing was not required and the cost of the additional testing provided no benefit to the evaluation.

The Sector was unable to come to a consensus, and the Sector Chairman asked for a vote to see if the Sector agrees with the NTEP Committee decision to waive permanence testing for indicators and controllers used in CIM railway track scale type evaluations.

- 8 Sector members voted *to support* the NTEP Committee decision.
- 9 Sector members voted *not to support* the NTEP Committee decision.
- 1 Sector member *abstained* from voting.

**Recommendation: The Sector did not make a specific recommendation on this item and will forward the discussion and voting results to the NTEP Committee. This item will be carried over to the 2007 Weighing Sector agenda.**

### 15(b). Permanence Test Criteria for Railway Track Scales Used to Weigh In-Motion

**Source:** NTEP Director (**Note:** This was listed as agenda Item 15(b) in the original agenda.)

**Background:** There are no criteria specified in the permanence test paragraph on page DES-100 of Section 68 of NCWM Publication 14 - Performance and Permanence Tests for Railway Track Scales Used to Weigh-In-Motion, other than the requirements to repeat the tests after a minimum of 20 days after the initial performance test. There needs to be specific "minimum use" requirements in the permanence test similar to permanence test requirements for other weighing devices. For example, the permanence section should include a minimum number of cars (or hours) to be run across the device during the 20-day period.

**Discussion/Recommendation: The Sector discussed this item in conjunction with the previous item. During the discussion, the question arose if a WG was needed to better answer the technical issues, propose NTEP technical policies, and develop specific permanence test procedures for CIM performance and weighbridge, and possibly CIM indicators/controllers.**

**The Sector made no recommendation on this item since Don Onwiler reported that the NTEP Committee would reconsider their decision during their October 2006 meeting. This item will be carried over to the 2007 Weighing Sector Agenda.**

## 16. Added Item – Tare Annunciator at a Zero Net Load Indication

**Source:** California NTEP Laboratory

**Background:** This item was inadvertently left off the agenda.

The California NTEP laboratory has reported that some scales submitted for evaluation have a "TARE" annunciator in lieu of Gross or Net annunciators, which do not have a labeled "GROSS" or "NET" display. The scale operates as follows:

- With no weight on the scale, the display shows 0.000 lb with the words STABLE and ZERO on the display underneath the weight.
- With 5 lb on the load-receiving element, the scale displays 5.000 lb with the word STABLE on the display below the weight indication.
- When the TARE button is pressed, the scale displays 0.000 lb and the words STABLE and TARE are displayed below the weight indication. (See picture.)

- With 10 lb added to the load-receiving element, the scale displays 10.000 lb with STABLE and TARE displayed below the weight indication.
- When all weights are removed, the scale displays −5.000 with STABLE and TARE displayed below the weight indication.

The California NTEP laboratory is asking the Sector if the word "TARE" is considered to be similar to "TARE ENTERED" according to paragraph 46.1.5. in Publication 14 which states:

| | |
|---|---|
| 46.1.5. | A lighted legend or annunciator of TARE ENTERED or **similar statemen**t is used to indicate that a tare value has been entered and the display indicated net weight. |

The California NTEP laboratory recommended that the language be amended as follows:

| | |
|---|---|
| 46.1.5. | A lighted legend or annunciator of TARE ENTERED or words that clearly state ~~similar statement is used to indicate~~ that a tare value has been entered and the display indicated net weight. |

The other NTEP laboratories agreed that "TARE" should not be considered to be a similar statement as "TARE ENTERED" during their April 2006 meeting. Steve Cook and Jim Truex provided background information and stated that they, too, had questioned the use of the term "TARE" back in the late 1970's. The response was given that it had been accepted as "TARE ENTERED" since the 1970's on devices evaluated under NBS Reports of Test (prior to NTEP). The NTEP laboratories believe that both terms "TARE" and "TARE ENTERED" alone do not clearly describe that net weights are being displayed. The laboratories also asked that the Tare WG discuss this item and which terms should and should not be used when the scale is displaying net weight.

The Tare WG has not discussed this item and was not able to provide the Sector with their position prior to the Sector meeting.

The Sector was asked to review the background information and the current language in Publication 16 Section 46.1. If the Sector agrees with the NTEP laboratories, they should review the following proposal to delete Publication 14 paragraph 46.1.5. to clarify that the terms TARE or TARE ENTERED alone are not acceptable as indication of the displayed net weight:

**Discussion/Recommendation: The Sector agreed that an indication of "zero" in the net mode should not be identified as "tare" as shown in above picture. Additionally, this example is not consistent with the intent of Handbook 44 General Code paragraphs G-S.5.1. (Indicating and Recording Elements). and General, G-S.5.2.4. Values. that state that primary indications shall be clear, definite, and adequately defined by a sufficient number of figures, words or symbols.**

**The Sector recommends that NCWM Publication 14 be amended as shown in Appendix A – Attachment to Item 16.**

**Editorial Note:** The NIST Technical Advisor also recommends that Publication 14 Section 46. Tare Operation – Facilitation of Fraud code references include Handbook 44 General Code paragraph G-S-5-2.4. Values and that paragraph 46.2. be amended by deleting the words "TARE ENTERED" and is shown in Appendix A – Attachment to Item 16.

## Next Sector Meeting

**Discussion/Recommendation: The Sector recommends that the 2007 meeting be held in conjunction with the WWMA Annual Technical Conference in Nevada. The WWMA is considering two different times for their technical conference; September 10 - 14 or October 1 - 4. The Sector prefers to meet after the conference if it is held in September or before the conference if it is held in October to keep it in the 2007 fiscal year.**

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# Appendix A

## Recommendations for Amendments to Publication 14[1]

## Attachment for Agenda Item 1(a) (Ballot Item and comments):

The results of the ballot are:

- 8 *affirmative* votes in favor of the proposed language,
- 3 *negative* votes against the proposed language unless amended to eliminate the word "identifier," and
- 1 member *abstained* from voting.

The three members who voted against the proposed language (and one other non voting member) commented that the use of the word "identifier" was inappropriate although it was adopted into HB 44 by the 91st NCWM during their 2006 Annual Meeting. Other Sector members that voted for the proposed language commented that they also agreed that the word "identifier" was not appropriate, but stated that the language in Publication 14 should reflect the language adopted into HB 44.

During the 2007 Interim Meeting, the NTEP Committee reviewed the ballot language and results. They also considered all comments that were received during the balloting process regarding the use of the word "identifier" that was adopted during the NCWM 2006 Annual Meeting. The Committee concurred with the three sector members who voted against the proposed language and agreed that the word "designation" will remain in Publication 14.

**(DES 2) B. Certificate of Conformance Parameters**

Certificates of Conformance (CC) shall detail the main elements, load cells, and auxiliary devices used during an evaluation, including model ~~designation~~**identifier** and other significant parameters, under the "Test Conditions" portion of the CC. Only the standard features and options that have been evaluated will be included on the CC.

**(DES 6) 8. Weighing Systems, Scales or Weighing/load-receiving elements Greater than 30 000 lb Capacity**

In the case of a weighbridge design where the deck is integrated into the weighbridge to be structurally significant, both concrete and steel decks must be tested separately to cover both options on an NTEP Certificate of Conformance. Full NTEP tests are required on both options unless NTEP decides otherwise. A composite scale consisting of a minimum of two decks, (i.e., two spans), one span deck being of steel construction and the other of concrete may be submitted and tested to include both types of decks. Concrete-deck and steel-deck scales should be marked with unique model ~~designations~~**identifier** to indicate the difference in platform material.

**(DES 17) 1. Marking - Applicable to Indicating, Weighing/Load-Receiving Elements and Complete Scales**
Virtually all weighing and measuring equipment (except separate parts necessary to the measurement process but not having any metrological effect) must be clearly and permanently marked with the manufacturer's name or trademark, model ~~designation~~**identifier**, and serial number. "Permanent" markings addresses two aspects: (1) the printed information will withstand wear and cleaning, and (2) if the markings are on a plate or badge, then the marking badge must be "permanently" attached to the device. Permanence of it must be obvious that the badge or plate containing this information has been removed. All markings must be clear and attachment of the badge means that the identification information required by G-S.1. is not easily removed, if it is removed, then easily readable. The following test procedure shall be used to determine the permanence of the identification markings.

[1] Recommended changes to Publication 14 are indicated in shaded, ~~strike out~~, and underlined text.

The system must be clearly and permanently marked on an exterior surface, visible after installation, as follows:

1.1 The name, initials, or trademark of the manufacturer or distributor. A remote display is required to have the manufacturer's name or trademark and model ~~designation~~**identifier**. (Code Reference G-S.1.) **Yes ☐ No ☐ N/A ☐**

1.2 A model ~~designation~~**identifier** that positively identifies the pattern or design of the device. The Model ~~designation~~**identifier** shall be prefaced by the word "Model," "Type," or "Pattern." These terms may be followed by the term "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." (Code Reference G-S.1.) **Yes ☐ No ☐ N/A ☐**

**(DES 23) 3. Additional Marking Requirements - Not Built-for-Purpose Software-Based Devices**
**References: G-S.1. (c) and G-S.1.1.**

~~For software-based, not built-for-purpose devices, the required G-S.1. marking information shall be:~~

- ~~permanently marked on the device, or continuously displayed, or~~
- ~~displayed in a clearly identified "System Identification", "G-S.1. Identification", or~~
- ~~Weights and Measures Identification" that is accessible through the "Help" menu or submenu.~~

3.1. ***2006 language was amended and moved to new Section 3.3.*** **Yes ☐ No ☐ N/A ☐**

For software-based, not built–for–purpose devices, the required G-S.1. marking information shall include the current version or revision identifiers in G-S.1. (d) instead of non repetitive serial numbers in G-S.1. (c). The words "version" or "revision" shall be prefaced by words, an abbreviation, or a symbol that clearly identifies the number as the required version or revision.

3.2. ***2006 language was deleted and replaced with language in 3.32.*** **Yes ☐ No ☐ N/A ☐**

If an abbreviation is used for the words "version" or "revision," the abbreviation shall begin with an uppercase "V" or "R" followed by the number. Acceptable examples include, "Ver. 1234," "V 1234," "REV 1234," and "R 1234." Unacceptable abbreviations include "v 1234," "ver 1234," "r 1234," and "rev 1234."

3.3~~1~~. At least one of the following methods in 3.3.1. or 3.3.2. must be used:

3.3.1. The required information in G-S.1. (a), (b), (d), and (e) ~~manufacturer or distributor and the model identifier designation are~~shall be (check all that apply): **Yes ☐ No ☐ N/A ☐**

☐ permanently marked on the device according to Section 1 Markings - Applicable to Indicating, Weighing/Load-Receiving Elements and Complete Scales~~.~~, or

☐ continuously displayed, or

☐ accessible through an easily recognized menu, and if necessary, a sub menu. Examples of menu and submenu include, but are not limited to "Help," "System Identification," "G-S.1. Identification," or "Weights and Measures Identification."

3.3.1.1. If the ~~"Help"~~ menu or submenu is used to access the required marking information, the ~~"Help"~~ menu or submenu must be a part of the main operator screen that is used during normal operation of the device. **Yes ☐ No ☐ N/A ☐**

3.3.1.2. If the ~~"Help"~~ menu or submenu is used to access required marking information it must be limited to view-only access. **Yes ☐ No ☐ N/A ☐**

| | | | |
|---|---|---|---|
| | 3.3.2. | The Certificate of Conformance number may be permanently marked or displayed on the device. If this method is used then 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 is the same type that was evaluated. | **Yes ☐ No ☐ N/A ☐** |
| List instructions for accessing the required G-S.1. markings using a menu or submenu, or by referencing the information on the CC: | | | |
| | ~~3.1.2.~~ | ~~The manufacturer or distributor and the model designation are continuously displayed on the device.~~ | ~~**Yes ☐ No ☐ N/A ☐**~~ |
| | ~~3.1.3.~~ | ~~The manufacturer or distributor and the model designation are accessible through the "Help" menu. Clear instructions for accessing the remaining required information shall be listed on the CC.~~ | ~~**Yes ☐ No ☐ N/A ☐**~~ |
| ~~3.2.~~ | ~~At least one of the following methods must be used:~~ | | |
| | ~~3.2.1.~~ | ~~The Certificate of Conformance (CC) Number is permanently marked on the device.~~ | ~~**Yes ☐ No ☐ N/A ☐**~~ |
| | ~~3.2.2.~~ | ~~The Certificate of Conformance (CC) Number is continuously displayed on the device.~~ | ~~**Yes ☐ No ☐ N/A ☐**~~ |
| | ~~3.2.3.~~ | ~~The Certificate of Conformance (CC) Number is accessible through the "Help" menu or submenu. Clear instructions for accessing the remaining required information shall be listed on the CC.~~ | ~~**Yes ☐ No ☐ N/A ☐**~~ |
| ~~3.3.~~ | ~~All required marking information that is not permanently marked on the device or not continuously displayed must be accessible in an easily recognized clearly identified "System Identification", "G-S.1. Identification", or "Weights and Measures Identification" that is accessible through the "Help" menu or submenu.~~ | | ~~**Yes ☐ No ☐ N/A ☐**~~ |
| ~~3.4.~~ | Moved to 3.3.1.1. | | ~~**Yes ☐ No ☐ N/A ☐**~~ |
| ~~3.5.~~ | ~~The software is identified with a software version that is sufficient to identify that the software is the same type evaluated.~~ | | ~~**Yes ☐ No ☐ N/A ☐**~~ |
| ~~3.6.~~ | Moved to 3.3.1.2. | | ~~**Yes ☐ No ☐ N/A ☐**~~ |
| ~~3.7.~~ | ~~Clear instructions for accessing the remaining required information shall be listed on the CC.~~ | | ~~**Yes ☐ No ☐ N/A ☐**~~ |
| ~~List instructions for accessing the required G-S.1. markings:~~ | | | |

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| | | |
|---|---|---|
| 5.7. | ***(Delete Existing paragraphs 5.7. through 5.7.4).*** | **Yes ☐ No ☐ N/A ☐** |
| | For software-based, not built–for–purpose devices, the required G-S.1. marking information shall include ~~be~~ the current version or revision identifiers in G-S.1. (d) instead of non repetitive serial numbers in G-S.1. (c). The words "version" or "revision" shall be prefaced by words, an abbreviation, or a symbol that clearly identifies the number as the required version or revision. | |
| 5.8. | If an abbreviation is used for the words "version" or "revision," the abbreviation shall begin with an uppercase "V" or "R" followed by the number. Acceptable examples include, "Ver. 1234," "V 1234," "REV 1234," and "R 1234." Unacceptable abbreviations include "v 1234," "ver 1234," "r 1234," and | **Yes ☐ No ☐ N/A ☐** |

| | | | |
|---|---|---|---|
| | "rev 1234." | | |
| 5.9. | At least one of the following methods in 5.7. or 5.8. must be used: | | |
| | 5.9.1. | The required information in G-S.1. (a), (b), (d), and (e) ~~manufacturer or distributor and the model identifier designation are~~shall be (check all that apply:<br><br>☐ permanently marked on the device according to Section 1 Markings - Applicable to Indicating, Weighing/Load-Receiving Elements and Complete Scales~~.~~, or<br><br>☐ continuously displayed, or<br><br>☐ accessible through an easily recognized menu, and if necessary, a sub menu. Examples of menu and submenu include, but are not limited to "Help," "System Identification," "G-S.1. Identification," or "Weights and Measures Identification." | **Yes ☐ No ☐ N/A ☐** |
| | | 5.9.1.1. If the ~~"Help"~~menu or submenu is used to access the required marking information, the ~~"Help"~~menu or submenu must be a part of the main operator screen that is used during normal operation of the device. | **Yes ☐ No ☐ N/A ☐** |
| | | 5.9.1.2. If the ~~"Help"~~menu or submenu is used to access required marking information it must be limited to view only access. | **Yes ☐ No ☐ N/A ☐** |
| | 5.9.2. | The Certificate of Conformance number may be permanently marked or displayed on the device. If this method is used then 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 is the same type that was evaluated. | **Yes ☐ No ☐ N/A ☐** |

List instructions for accessing the required G-S.1. markings using a menu or submenu, or by referencing the information on the CC:

_____

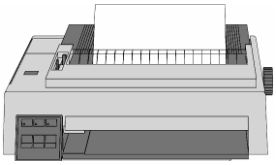
_____

**(ECRS 8-9) 7. Marking Requirements**

**Figure 1.**
**Example of Marking Requirements for Various System Components**

**COMMON COMPONENTS**
**Electronic Cash Register**
- Model ~~Designation~~Identifier

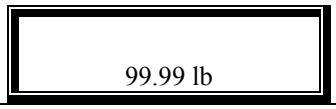
**Cash Acceptor, Card Reader, Etc. Which Authorizes Sales**
- Model ~~Designation~~Identifier



**Printer**
- G-S.1.
- Manufacturer's ID
- Model ~~Designation~~Identifier
- Serial Number and Prefix

**Figure 2.**

**WEIGHING SYSTEMS**
**Weighing/load receiving element**
- ~~Designation~~Identifier




**Indicating Element**
- Model ~~Designation~~Identifier
- Serial Number and Prefix

## Attachment for Agenda Item 1(b)

**(DES-78) 58. Time Dependence Test**

This test shall be conducted on Class II, III and IIII complete scales and W/LREs in a laboratory. The applied load shall be between 90 % and 100 % of capacity for scales with capacities of 2000 lb or less. For scales with capacities greater than 2000 lb, the load cell or load cells shall be tested individually. The test shall be conducted at 20 °C ± 2 °C (68 °F ± 4 °F) ~~the temperature extremes specified for the device under test (DUT)~~.

For Class III L scales . . .

***Technical Advisor's Note:*** No changes to the Time Dependence Test Form are necessary.

## Attachment for Agenda Item 1(c)

**(FT 13 – 14) II. Determination of Creep**

1. At 20 °C ambient, insert the force transducer (load cell) into the force generating system and load to the minimum dead load. If Procedure I. (which includes increasing and decreasing load tests) has just been completed, wait 1 hr. If a separate creep test is being conducted, exercise the force transducer (load cell) as in Procedure I.5 and then wait 1 hr.

2. If the indicating element for the force transducer (load cell) is provided with a convenient means for checking itself, conduct the self-test at this time.

3. Monitor minimum load output until stable.

4. ~~There are two test methods to determine the creep characteristics of force transducers (load cells). The 1 hr creep test at the maximum load (step 4. (a)) is the preferred form of the creep test; run the return to zero creep test (step 4. (b)) only when justified by limitations in the test equipment. The NTEP will conduct step 4. (a) creep tests whenever possible.~~

~~Take readings at 1 min time intervals for the first 10 minutes and every 10 min thereafter.~~

   a. **Test for Creep:** Apply a load equal to 90 % to 100 % of the maximum capacity of the force transducer (load cell) and record the indication 20 sec after reaching the load. The time to load test weights and read the indicator shall be as short as possible and shall not exceed the time specified in Table 5. With the load remaining on the load cell, c~~C~~ontinue to record indications periodically, thereafter, at time intervals over a 30 min ~~1 hr~~ period.

~~*Note: A 30 min test is acceptable if the creep test is performed in accordance to OIML R 60 tolerances.*~~

   b. **Test for Creep Recovery:** Remove a load equal to 90 % to 100 % of the maximum capacity of the force transducer (load cell) that has been applied for 1 hr. Record the indication after 20 sec. The time to unload test weights and read the indicator shall be as short as possible and not exceed the time specified in Table 5. Continue to record indications periodically thereafter at time intervals over a ~~1 hr period (or~~30 min period~~if the creep test is conducted according to OIML R 60 requirements)~~.

| Table 5 Loading Times | |
|---|---|
| **Load** | |
| | |

5. Repeat the operations described in steps 2 through 4 at the high and low temperature limits for the accuracy class~~.~~; ~~i~~If the manufacturer has specified a smaller or a larger range, repeat operations at the limits marked on the cell, provided the temperature range is at least the range required for the accuracy class.

6. With the resulting data, and accounting for the effect of barometric pressure changes, determine the magnitude of the creep and compare it to the tolerance in NIST Handbook 44 Scales Code Table T.N.4.6.

**Table T.N.4.6.** Time Dependence (Creep)
**Maximum Permissible Error (mpe) * for Load Cells**
**During Type Evaluation**

| **mpe in Load Cell Verifications Divisions (v) = $p_{LC}$ x Basic Tolerance in v** | | | |
|---|---|---|---|
| **Class** | $p_{LC}$ x 0.5 v | $p_{LC}$ x 1.0 v | $p_{LC}$ x 1.5 v |
| I | 0 - 50 000 v | 50 001 v - 200 000 v | 200 001 v + |
| II | 0 - 5 000 v | 5 001 v - 20 000 v | 20 001 v + |
| III | 0 - 500 v | 501 v - 2 000 v | 2 001 v + |
| IIII | 0 - 50 v | 51 v - 200 v | 201 v + |
| III L | 0 - 500 v | 501 v - 1 000 v | (Add 0.5 v to the basic tolerance for each additional 500 v or fraction thereof up to a maximum load of 10 000 v) |

v represents the load cell verification interval
$p_{LC}$ represents the apportionment factors applied to the basic tolerance
$p_{LC}$ = 0.7 for load cells marked with S (single load cell applications)
$p_{LC}$ = 1.0 for load cells marked with M (multiple load cell applications)
$p_{LC}$ = 0.5 for Class III L load cells marked with S or M
* mpe = $p_{LC}$ x Basic Tolerance in load cell verifications divisions (v)

## Attachment for Agenda Item 4

### D. Force Transducers (load cells) to be Submitted for Evaluation

Force transducers (load cells) of essentially the same design may be considered to form a family that can be listed on an NTEP CC. If force transducers (load cells) within a family are made from different materials, such as aluminum, alloy steel, or stainless steel, then all material types must be submitted for evaluation. If the force transducers (load cells) within a family are available in either a 4-wire or 6-wire version, then at least one 4-wire version and one 6-wire version must be evaluated. This policy applies to all applications for new or amended NTEP Certificates of Conformance received after January 31, 2007. This policy is non-retroactive for NTEP Certificates of Conformance issued prior to February 1, 2007.

Under the Mutual Acceptance Arrangement (MAA) for the International Organization of Legal Metrology (OIML), it is possible to obtain either an NTEP CC or an OIML R 60 Certificate or both with a single evaluation. NCWM is a utilizing participant under the MAA and as such will accept test data from issuing participants within the MAA. Evaluations performed by NTEP laboratories can only result in an NTEP CC. These certificates can cover a family of force transducers (load cells) based on the evaluation of representative samples from the family. In order to determine which specific models of force transducers (load cells) are to be used for evaluation, the following selection criterion shall be used:

1. *Evaluation of New Force Transducers (load cells) for NTEP Certificates Only*

Required Information

The following information is required from the manufacturer for review and selection of sample force transducers (load cells):

a. Properly completed request for evaluation

b. Drawing of each capacity force transducer (load cell) within the family to substantiate that they are of the same basic design

c. Quality or accuracy class

d. Maximum number of scale divisions requested (n-max)

e. Minimum verification scale division requested (V-min)

f. Force transducer (load cell) capacities

g. The type(s) of material from which the force transducers (load cells) are made

h. As applicable, outline dimensions and general description illustration of any special equipment (loading fixtures, interconnection boxes, etc.) that are intended to accompany the force transducers (load cells) submitted

i. A complete set of test data on the force transducers (load cells) submitted for evaluation. (Test data is only required for those force transducers (load cells) submitted for type evaluation; test data for each capacity model in the family is not required.)

j. The technology employed by the force transducer (load cell); e.g. strain gage (analog or digital), hydraulic, vibrating wire, piezoelectric, or other. Applicants for analog strain gage force transducers (load cells) must indicate on the application whether 4-wire or 6-wire (or both) design force transducers (load cells) are included in the family.

Note: The manufacturer may market force transducers (load cells) with a smaller number of scale divisions (n-max) and/or with a larger V-min value than those listed on the approval certificate; however, the force transducer (load cell) or accompanying documentation must be marked with the appropriate n-max and V-min for which the force transducer (load cell) may be used.

Selection Criteria

A. Selection of force transducers (load cells) from the family shall be based on the following considerations:

1. The selection of force transducers (load cells) shall be such that the number of force transducers (load cells) to be evaluated is minimized.

2. Where force transducers (load cells) of the same capacity belong to different groups within the family, approval of the force transducer (load cell) with the best metrological characteristics (greatest n-max, smallest V-min) implies approval of the force transducers (load cells) with the lesser metrological characteristics. When a choice exists, the force transducers (load cells) with the best metrological characteristics shall be selected for the evaluation.

3. Force transducers (load cells) with a capacity in between the capacities evaluated, as well as those with a capacity greater than the largest capacity model tested, but not over five times the largest capacity evaluated, are deemed to be approved.

4. For any family of force transducers (load cells), the model with a capacity nearest the center of the range of capacities and with the best metrological characteristics shall be selected for evaluation. When the ratio of the largest capacity force transducer (load cell) within the group or family to the smallest capacity force transducer in the same group or family is 10:1 or less, a cell with a capacity nearest the center of the range shall be selected. The capacity of the selected cell shall not have a ratio greater than 5:1 in regard to the capacity of the force transducers (load cells) at the each extreme of the capacity range. If this is not possible, a second force transducer (load cell) must be selected for evaluation (see Item 5 below). If the selected mid-range capacity cell cannot be evaluated due to laboratory limitations, the NTEP representative should be contacted to select the specific model for evaluation.

5. When the ratio of the largest capacity force transducer (load cell) within the group to the smallest capacity force transducer (load cell) within the same group or family significantly exceeds 10:1, then another force

transducer (load cell) shall be selected for evaluation. The selected force transducer (load cell) shall have a capacity between 5 and 10 times that of the first force transducer (load cell) that was selected for evaluation. When no capacity meets this criteria, the selected force transducer (load cell) shall be that having the smallest capacity that exceeds 10 times that of the nearest smaller capacity force transducer (load cell) that has been selected for evaluation. Should the capacity of the selected cell exceed the capacity of the greatest capacity model in the family or group by a ratio greater than 10:1, an additional model must be selected for evaluation.

6. If both 4-wire and 6-wire designs of force transducers (load cells) are included in the family, then at least one of the selected models for evaluation shall be of the 4-wire design and at least one of the remaining models shall be of the 6-wire design.

7. If the family of force transducers (load cells) includes two or more types of material used for construction of the device, then at least one of the selected models for evaluation shall be of each type of material used for construction.

8. If the family of force transducers (load cells) includes two or more means of environmental sealing (potting, welded cups, etc.) then at least one model using each sealing means shall be selected for evaluation.

9. If the family of force transducers (load cells) includes two or more output levels (2 or 3 mV/V), then at least one model with each output level shall be selected for evaluation.

B. Examples of force transducer (load cell) model selection for evaluation:

a. Force Transducer (load cell) Family A characteristics
   1. Both stainless steel and alloy steel models
   2. 2 mV/V and 3 mV/V outputs
   3. Bending beams in smaller capacities and shear beam in larger
   4. 4-wire and 6-wire designs
   5. n-max is 5000 on all models
   6. Potting or welded metal cup sealing variations
   7. All V-min values equal to 0.015 % of cell capacity
   8. All capacities in pounds:
      500, 1000, 2000, 2500, 4000, 5000, 7500, 10 000, 15 000, 20 000

The following cell models would be selected for evaluation:

- One - 500 lb stainless steel, potted, 3 mV/V, 4-wire bending beam cell
- One - 2500 lb alloy steel, potted, 2 mV/V, 4-wire shear beam cell
- One - 15 000 lb stainless steel, welded, 3 mV/V, 6-wire shear beam cell

Note that Item 2 in Part A above is not applicable in this situation since the metrological characteristics (n-max and V-min) for all of the models are equivalent.

Note that Item 3 in Part A above is met since the 20 000 lb model is less than five times the capacity of the greatest capacity model selected for evaluation (15 000 lb).

Note that Item 4 in Part A above is met since the 2500 lb capacity model of force transducer (load cell) is the closest to the center and is able to meet the requirements in both Item 4 and 5 and therefore was selected for evaluation.

Note that Item 5 in Part A above is met since the ratio between the capacities of the models selected for evaluation does not exceed five.

Note that Item 6 in Part A above is met by having at least one of the models selected of a 4-wire design and at least one of the models selected of a 6-wire design.

Note that Item 7 in Part A above is met by having at least one of the models constructed from each type of materials used.

Note that Item 8 in Part A above is met by having at least one of the selected models with each environmental sealing method employed within the family.

Note that Item 9 in Part A above is met by having at least one of the selected models with a 3 mV/V output and at least one with a 2 mV/V output.

b. Force Transducer (load cell) Family B characteristics
   1. Compression cells constructed from either alloy steel or stainless steel
   2. All cells are Class III L
   3. Cells from 10 000 lb to 75 000 lb have an n-max of 7500 and cells from 50 000 lb to 200 000 lb have an n-max of 10 000
   4. All cells are 2 mV/V
   5. All cells have the same environmental sealing
   6. All cells have V-min values equal to 0.018 % of their capacity
   7. All cells are of 6-wire design
   8. Cell capacities are:
      10 000; 25 000; 50 000; 75 000; 100 000; 200 000

The following models would be submitted for evaluation:

- One - 50 000 lb with an n-max of 10 000 in stainless steel
- One - 10 000 lb in alloy steel

Note that Item 2 in Part A above is met with the selection of the 50 000 lb model with an n-max of 10 000 since it has the best metrological characteristics.

Note that Item 3 in Part A above is met with the selection of the 10 000 lb model. Selection of the 200 000 lb model could have taken place but the 10 000 lb model was chosen because of the ease of testing.
Note that Item 4 in Part A above is met with the selection of the 10 000 lb model since it is within the 5:1 capacity ratio of the 50 000 lb model initially selected.

Note that Item 5 in Part A above is met with the selection of the 10 000 lb model since the ratio of its capacity to that of the 50 000 lb model does not exceed 5:1.

Note that Item 6 in Part A above does not apply since all models are of 6-wire design.

Note that Item 7 in Part A above is met with the selection of the 10 000 lb model in stainless steel and the 50 000 lb model in alloy steel thus covering both types of material used for construction of the force transducers (load cells) in the family.

Note that Item 8 in Part A above does not apply since all models use the same means of environmental sealing.

Note that Item 9 in Part A above does not apply since all models use the same output level of 2 mV/V.

2. *Evaluation of New Force Transducers (load cells) for OIML R 60 Certificate or OIML R 60 Certificate and NTEP Certificate of Conformance under the DoMC*

Required Information

The information needed for an OIML R 60 evaluation is listed in OIML Recommendation 60. If the manufacturer is seeking an NTEP Certificate of Conformance for the force transducer (load cell) family or individual model, the information shown in Section 1 above shall also be provided along with a properly completed application for NTEP

evaluation. All NTEP requirements are to be met in this type of evaluation. The manufacturer must make certain that the issuing participant selected for the evaluation of the force transducer(s) (load cell(s)) is aware that the submittal is for both NTEP and OIML R 60. A completed application and copies of all submitted data must be sent to NTEP. Once the evaluation has been successfully completed, the issuing authority will provide an OIML Evaluation Report that may then be used to secure an OIML R 60 Certificate. This report is also sent to NTEP. NTEP will evaluate the OIML Evaluation Report and issue an NTEP Certificate of Conformance based on this evaluation. Note that issuance of an NTEP Certificate of Conformance may require the conduct of other tests not performed by the issuing participant. If this happens, the costs of these tests are the responsibility of the applicant.

Note: Should the force transducers (load cells) submitted fail to comply with all OIML R 60 requirements and the manufacturer then seeks to secure an NTEP Certificate of Conformance based on the OIML Evaluation Report, additional testing may be required in order to fully determine compliance of the device(s) with NTEP requirements. The costs for any additional testing deemed necessary for completion of the NTEP review will be the responsibility of the applicant.

Selection Criteria

Selection of the force transducers (load cells) for evaluation shall be based on the OIML R 60 selection criteria as described in OIML Recommendation 60.

3. *Amendment of an Existing NTEP Certificate of Conformance to Add Capacities and/or Change Metrological Characteristics in Conjunction with an OIML R 60 Evaluation Under the DoMC*

Required Information

The information needed for an OIML R 60 evaluation is listed in OIML Recommendation 60. If the manufacturer is seeking to amend an existing NTEP Certificate of Conformance for the force transducer (load cell) family or individual model, the information shown in Section 1 above shall also be provided along with a properly completed application for NTEP evaluation. All NTEP requirements are to be met in this type of evaluation.

Successfully completed, this type of evaluation will result in a test report and test certificate that may be used to secure an amended OIML R 60 Certificate. The test report will be reviewed by the NTEP and if the appropriate criteria are met a NEW NTEP Certificate of Conformance will be issued. Note that the original NTEP Certificate of Conformance will remain active and will not be amended. The new NTEP Certificate of Conformance resulting from this evaluation will list the new capacities added and/or the change in metrological characteristics. Note that the appropriate NTEP Certificate of Conformance number must be marked on the device in compliance with G-S.1. Marking Requirements of NIST Handbook 44.

Note: Should the force transducers (load cells) submitted fail to comply with all OIML R 60 requirements and the manufacturer then seeks to only amend the existing NTEP Certificate of Conformance based on the test report, additional testing may be required in order to fully determine compliance of the device(s) with NTEP requirements. The costs for any additional testing deemed necessary for completion of the NTEP review will be the responsibility of the applicant.

Selection Criteria

The proper models for evaluation will depend upon the nature of the change or addition to be made. Because of this, NTEP personnel shall be contacted and shall determine which model or models of force transducer (load cell) are to be submitted.

4. *Amendment of an Existing NTEP Certificate of Conformance ONLY*

Required Information

The required information will depend upon the nature of the change being made. If additional models of force transducers (load cells) are being added to a family, then the same information and selection criteria as listed in

Section 1 above apply. If the change is to add another version of the force transducer (load cell) listed on the current NTEP Certificate of Conformance the nature of the change or addition must be fully disclosed in the application.

Selection Criteria

The necessity of an evaluation to implement the requested change will depend upon the nature of the change. In general, addition of new models of force transducers (load cells) with capacities outside the 5:1 ratio of those previously evaluated will require additional evaluation. Addition of a 4-wire design with no change in capacity will require an evaluation while the addition of a 6-wire design with no change in capacity will not. The addition of models constructed from a different material will require the evaluation of at least one model constructed of the new material. NTEP personnel will inform you of what models, if any, require evaluation after review of the application.

## Attachment for Agenda Item 5

## 31. Multi-Interval Scales

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There are several considerations regarding the proper operation of tare on multi-interval scales.

- All tares must be taken in the minimum increment. Therefore, the maximum tare allowed is the maximum capacity of the smallest weighing segment (WS).
- Whenever gross and tare weights fall in different weighing segments, (hence the scale divisions for the gross and tare weights differ), the net weight must be in mathematical agreement with the gross and tare weights that are indicated and recorded, (i.e., net = gross - tare).
- Scales that display or record only net weight values (e.g., most computing scales) may semi-automatically (pushbutton) take tare values to either the internal resolution or the displayed scale division.
- Manually entered keyboard, thumb-wheel, and digital tare values, and programmable tare values stored in memory for multiple transactions must be entered to the displayed scale division.

In applying these principles, it is acceptable to:

- round the indicated and printed tare values ~~(in the upward direction to the nearest)~~ to the nearest appropriate net weight scale division.

- or display net weight values in scale divisions other than the scale division used in the display of gross weight, as when the gross and tare weights are in different ranges of the device. For example, a scale indicating in 2-lb divisions in the lower range and 5-lb divisions in the next higher range may result in net values ending in three or eight in the higher range.

In every case, it is required to maintain the mathematically correct equation:

~~net + tare = gross~~ net = gross - tare

For multi-interval instruments, all tares, except for semi-automatic tare, must be taken in the minimum increment. Therefore, the maximum tare allowed is the maximum capacity of the smallest weighing range.

Semi-automatic tare may be taken to the internal resolution of the scale and any indications or recorded representations of tare shall be rounded to the nearest verification scale division.

31.1. The requirements for the displayed scale division and the mathematical agreement of gross, tare, and net values depend on the information that can be displayed or recorded by the weighing system and may be summarized as follows:

| | | |
|---|---|---|
| 31.1.6. | Keyboard, programmable, and digital, tare entries, and tare stored in memory for multiple transactions must be consistent with the displayed division size. Incorrect entries may be rounded to the nearest displayed scale division or rejected. | **Yes ☐ No ☐ N/A ☐** |
| 31.1.7. | Devices equipped with a tare capability must, at all times, indicate and record values that satisfy the equation net = gross - tare. | **Yes ☐ No ☐ N/A ☐** |
| 31.1.8. | Devices equipped with a semi-automatic (push-button) tare must meet the tolerances for net loads for any tare value. | **Yes ☐ No ☐ N/A ☐** |
| 31.1.9. | Scales that display or record only net weight values (e.g., most computing scales) | |
| | • may take semi-automatic (push-button) tare and gross values to ~~either~~ the internal resolution of the scale. Printed and displayed net weights shall be rounded to the nearest division, or ~~the displayed scale division.~~ | **Yes ☐ No ☐ N/A ☐** |
| | • may take all tare values to ~~either the internal resolution or~~ the displayed scale division, and~~.~~ | **Yes ☐ No ☐ N/A ☐** |
| | • must always begin with the lowest weighing segment on the device regardless of the amount of tare that is taken. | **Yes ☐ No ☐ N/A ☐** |

31.2. For scales that indicate in only one mode (gross or net) while under load, the scale division for the net weight, whether positive or negative, must be displayed in scale divisions consistent with the weighing range in which the net weight falls.

| | | |
|---|---|---|
| 31.2.4. | Devices equipped with semi-automatic (push-button) tare must meet the tolerances for net loads for any tare taken up to the tare capacity of the scale. | **Yes ☐ No ☐ N/A ☐** |
| 31.2.5. | Whenever semi-automatic (push-button) tare is taken and a scale is equipped with only a net display mode, the net weight values must always begin with the lowest weighing range on the device. | **Yes ☐ No ☐ N/A ☐** |
| 31.2.9. | For all weighing segments ~~ranges,~~ e must equal d. | **Yes ☐ No ☐ N/A ☐** |

## 32. Multiple Range Scales

A multiple range scale is an instrument having two or more weighing ranges with different maximum capacities and different scale intervals for the same load receptor, each range extending from zero to its maximum capacity. The weighing ranges may be either manually or automatically selected. Each weighing range is considered to be an individual scale and evaluated accordingly.

The capacity and verification scale division for each weighing range must be conspicuously marked ~~near~~ on the reading face of the weight display. The range in use must be clearly indicated. If a scale has a decimal point and a different number of decimal places in each weighing range, the position of the decimal point and the number of digits following is an adequate definition of the weighing range in use. If the weighing ranges do not utilize a decimal point and differing numbers of decimal places, (e.g., scale division are 20 lb, 50 lb, and 100 lb), another method such as an external range indicator must be provided to indicate the weighing range in use.

Whenever gross and tare weights fall in different weighing ranges so that the scale divisions for the gross and tare weights differ, the net weight must agree mathematically with the gross and tare weights that are indicated or recorded (i.e., net = gross - tare)

On a multiple range instrument, a tare value may only be transferred from one weighing range to another one with a larger verification scale interval and ~~but~~ shall then be rounded ~~in the upward direction~~ to the nearest scale division of the latter verification interval.

32.1 The range in use shall be conspicuously indicated. **Yes ☐ No ☐ N/A ☐**

32.3 Devices with a tare capability must indicate and record values that satisfy the equation net = gross - tare and round the tare value ~~up~~ to the nearest ~~larger~~ division size when entering the larger division. Examples, 2 g changes to ~~5~~0 g not ~~0~~5 g and 3 g changes to 5 g not 0 g. **Yes ☐ No ☐ N/A ☐**

32.4 Keyboard tare entries must be consistent with the displayed scale division. **Yes ☐ No ☐ N/A ☐**

## Attachment for Agenda Item 8

### 37. Grain Test Scales

Code Reference: G-S.2., S.2.1.2., and S.2.3., UR.1.4.

Grain test scales are those used for weighing grain samples to determine moisture content, dockage, weight per unit volume, etc. These scales may compute percentages based upon a stored sample weight and a load placed on the scale platform. The scale may also compute a weight per bushel or hectoliter based upon a specified volume of grain placed on the platform.

If a scale is to be used by the Grain Inspection Packers and Stockyards Administration (GIPSA~~, formerly the Federal Grain Inspection Service, U.S. Department of Agriculture~~), for the official grading of grain, the scales must meet more stringent requirements than are necessary for Handbook 44 applications **and listed on the NTEP CC**. These differences are given in Items ~~7, 8, and 9~~ 37.8. and 37.9.

37.7. **For Handbook 44 only (non-GIPSA) applications**, percent calculations may not be displayed unless the value of the scale division is less than or equal to 0.2 g for loads up to 500 g and less than or equal to 1.0 g for loads greater than 500 g. (See NIST Handbook 44 Scales Code paragraph UR.1.4.) **Yes ☐ No ☐ N/A ☐**

37.8. **For GIPSA grain test scale applications to be listed on the CC,** calculations for test weight must be based on a sample size of one quart only. Calculations are not to be based on a sample size of ~~one~~1 pint nor shall the capability to compute the test weight per bushel on the basis of 1 pint ~~to be permitted on scales for use by the GIPSA~~. **Yes ☐ No ☐ N/A ☐**

37.9. **For GIPSA grain test scale applications to be listed on the CC,** the following requirements must be satisfied**:**

37.9.1. The percent values shall be rounded and displayed to at least 0.1 %.~~To calculate and display percent values, the verification scale division cannot exceed 0.01 g for loads up to 120 g and 0.5 g for loads in excess of 120 g through 1000 g.~~ **Yes ☐ No ☐ N/A ☐**

37.9.2. The verification scale division (e) for grain-test scales shall not exceed: **Yes ☐ No ☐ N/A ☐**

- 0.1 g for separations from loads through 500 g, and
- 1.0 g for separations from loads above 500 g through 1000 g.

For scales used to weigh separations from loads of 100 g and less, d shall be less than or equal to 0.01 g, but may utilize expanded resolution.~~The percent values shall be rounded and displayed to at least 0.1 percent.~~

37.9.3. Selection of a scale with an appropriate division size shall be a user requirement, based on the work portion size, and both the work portion and the separation shall be weighed using a scale with the same (or smaller~~better~~) ~~maximum~~ division size. For example: ~~To calculate and display test weight values, the verification scale division cannot exceed 0.5 g.~~ **Yes ☐ No ☐ N/A ☐**

| GIPSA Required Division Sizes | | |
|---|---|---|
| **Work Portion** | **Division Requirement** | **Accuracy Class** |
| ≤ 100 g | e ≤ 0.1 g; d ≤ 0.01 g | II ~~(expanded resolution*)~~ |
| > 100 g | e ≤ 0.1 g; d ≤ 0.1 g | II, III |
| > 500 g | e ≤ 1 g ; d ≤ 1 g | II, III |

~~37.9.4. For official weighing, the GIPSA has three categories of electronic laboratory scales used as grain test scales: precision, moisture, and general. The accuracy classes and scale divisions used for these scale categories shall not exceed those given in the following table.~~ ~~**Yes ☐ No ☐ N/A ☐**~~

| ~~Category~~ | ~~Accuracy Class~~ | ~~Scale Division~~ |
|---|---|---|
| ~~Precision~~ | ~~II~~ | ~~e ≤ 0.01 g d ≤ 0.01 g~~ |
| ~~Moisture~~ | ~~II, III~~ | ~~e ≤ 0.1 g d ≤ 0.1 g~~ |
| ~~General~~ | ~~II, III~~ | ~~e ≤ 0.5 g d ≤ 0.5 g~~ |
| ~~***NOTE:** For Class III scales e ≤ d. GIPSA requires that e = d for Moisture and General Categories, Class II grain scales used in GIPSA applications.~~ | | |

~~List the models and capacities that satisfy the requirements for each category.~~

## Attachment for Agenda Item 9

## 11. Indicating and Recording Elements – General

**Code References: G-S.2., G-S.5.1., G-S.5.2.2., and S.1.2.**

There are several general requirements to facilitate the reading and interpretation of displayed weight values. Other requirements address the proper operation of indicating and recording elements.

11.19 As used in this section, a wireless communications device may include weighing elements, load-receiving elements, indicating elements, recording elements (output), etc. that are capable of transmitting and/or receiving metrological information between elements.

The following procedures shall be used to evaluate indicating elements that communicate digital weight and other information from separable load-receiving elements or other peripheral equipment (i.e., PC or remote control) by means of a radio transmitter/receiver or other wireless communication devices. At least two (2) complete devices (e.g. crane scales) ~~indicating elements~~ shall be evaluated to ensure:

11.19.1 There is no interference from one complete device to another of the same type. **Yes ☐ No ☐ N/A ☐**

11.19.2 The signal from a weighing element is sent to the **appropriate** (correct) indicator. **Yes ☐ No ☐ N/A ☐**

11.19.3 The indicator displays an error message or displays meaningless information that could not be mistaken for a valid weight indication, when the signal from the weighing element (or the metrologically significant **Yes ☐ No ☐ N/A ☐**

| | | | |
|---|---|---|---|
| | peripheral equipment) is interrupted or blocked by all of the following actions: | | |
| | 11.19.3.1 | -turning the power off to the weighing element, | **Yes ☐ No ☐ N/A ☐** |
| | 11.19.3.2 | -turning the power off to the metrologically significant peripheral equipment, | **Yes ☐ No ☐ N/A ☐** |
| | 11.19.3.3 | -attempting to block the signal with a steel plate, or<br>-moving the indicator away from the weighing element, or<br>-moving the indicator away from the metrologically significant peripheral equipment.<br>Record the actions above (e.g., distance) at which an accurate indication is maintained: _____ .<br><br>This information is for reference purposes and will not be listed or reported on the CC. | **Yes ☐ No ☐ N/A ☐** |
| 11.19.4 | If the indicator can be connected to more than one W/LRE at the same time, by means of a radio link or other wireless means, the indicator will be evaluated with at least two weighing elements (placed side by side) with the wireless communication capability and shall meet all the same requirements as an indicator using physical connection to the weighing elements. | | **Yes ☐ No ☐ N/A ☐** |
| 11.19.5 | If more than one wireless communicating device ~~indicator~~can be connected to one single communicating device ~~weighing element~~at the same time using the wireless communication method, the evaluation will be performed with at least two indicators (placed side by side) and connected to the weighing element using the wireless communication method and shall meet all the same requirements as indicators using physical connection to the weighing element. | | **Yes ☐ No ☐ N/A ☐** |
| 11.19.6 | If the wireless communication is battery powered, the device continues to perform within applicable tolerance when the DC voltage to the device is lowered to the lowest DC voltage where a weight display is available and raised to the highest voltage recommended by the device manufacturer.<br><br>If the manufacturer does not specify the highest DC voltage, the device will be tested with a DC power supply equal to the nominal DC voltage. The device will then be tested with a DC power supply equal to the nominal DC voltage plus 10 %. The low power supply testing will be conducted at the maximum range (distance) determined at the nominal DC voltage which an accurate indication is maintained. | | **Yes ☐ No ☐ N/A ☐** |

## Attachment for Agenda Item 10

### 51. Proportional and Percentage Tare

**Code References: G-S.2, G-S.5.1, G-S.5.5.2.2, G-S.5.6**

Proportional tare is a value, automatically calculated by the scale, proportional to the gross weight indicated by the scale. A proportional tare can be a percentage tare or a fixed tare value proportional to a range of gross weights (i.e., a 10 g tare for gross weights between 0 and 2 kg, a 20 g tare for gross weights between 2 kg and 4 kg, etc.). A proportional tare is, therefore, not limited to being a percentage tare.

Percentage tare is a value, expressed as a percentage (i.e., 5.6 %), that represents the percentage of tare material

compared to the gross or net weight of the commodity. A percentage tare is one form of proportional tare.

The following terms and abbreviations will be used in determining percentage tare:

**GW1 = First Gross Weight**
**FTW = Fixed Tare Weight**
**GW2 = Final Gross Weight**
**% TV = Percentage Tare Value (example: 2 %, 5 %)**
**% TW = Percentage Tare Weight**
**NW = Net Weight**

| | | |
|---|---|---|
| 51.1 | The scale does not accept negative values for percentage tare. The tare shall operate only in the backward direction. | **Yes ☐ No ☐ NA ☐** |
| 51.2 | Percentage tare values may only be entered through the keyboard when the device is at gross load zero and in a "configuration" mode. | **Yes ☐ No ☐ NA ☐** |

Percentage and/or proportional tares may be preprogrammed into PLU codes. PLU codes may be entered or changed at any time, whether or not a load is on the platter.

Both fixed and percentage tares may be deducted from the gross weight to obtain the final net weight for a transaction. For instance, a PLU code may be preprogrammed with fixed and percentage tares; or a platter or keyboard tare may be manually entered first. Then a percentage tare may be applied, through a PLU code.

| | | |
|---|---|---|
| 51.3 | The tare weight shall not be rounded prior to subtracting the tare weight value from the gross weight. The tare value(s) must be deducted first and then the final net weight value rounded off to the nearest scale interval. Rounding of the net weight is not performed until the last mathematical operation. | **Yes ☐ No ☐ NA ☐** |
| 51.4 | The visual confirmation that a tare has been applied (i.e., "Net" annunciator) must only be enabled if the percentage tare multiplied by the final gross weight represents one or more scale intervals after the appropriate rounding. The turning on of the "Net" annunciator must only occur if tare has actually been applied to the gross weight. | **Yes ☐ No ☐ NA ☐** |
| 51.5 | Percentage tare shall be manually entered or preprogrammed as part of a PLU in units of percent (or as a decimal fraction, e.g., 1 % = 0.01). Percentage tare shall not exceed 99.9 %. | **Yes ☐ No ☐ NA ☐** |
| 51.6 | Except for POS systems, the net weight must be displayed when a percentage or proportional tare is entered. | **Yes ☐ No ☐ NA ☐** |
| 51.7 | If the device deducts both a fixed tare and a percentage tare from the gross weight, the fixed tare shall be deducted first. | **Yes ☐ No ☐ NA ☐** |

When percentage tare is used, the preferred method* of calculating the net weight is:
Net Weight = **(GW1–FTW) – GW2 (%TV/100)**

The net weight of the following example is:

| Scale | GW1 | FTW | GW2 | %TV | %TW = %TV * GW2 | NW |
|---|---|---|---|---|---|---|
| 15 kg x 5 g | 355 g | 10 g | 345 g | 10 | 34.5 g | 310.5 g |

Net Weight = **(GW1 – FTW) – [GW2 (%TV/100)]**
= (355 g – 10 g) – [345 g (10/100)]
= (345 g) – 345 g (0.10)
= 345 g – 34.5 g
= 310.5 g Rounded to the nearest scale division = 310 g

*Note: Another acceptable method of calculating the net weight is based on the percentage of net weight (%NW).

The percentage of net weight = **[1 - (%TV/100)]**).

Net Weight = **GW2 [1–(%TV/100)]**

The net weight of the following example is:

| Scale | GW1 | FTW | GW2 | %TV | %TW = %TV * GW2 | NW |
|---|---|---|---|---|---|---|
| 15 kg x 5 g | 355 g | 10 g | 345 g | 10 | 34.5 g | 310.5 g |

Net Weight = **(GW1–FTW) [1–(%TV/100)]**
= 345 g [1–(10/100)]
= 345 g [1–(.10)]
= 345 g [.90]
= 310.5 g Rounded to the nearest scale division = 310 g

## Attachment for Agenda Item 12

### 4. Additional Marking Requirements – W/LREs

**Code References: S.6., Table S.6.3.a., and Table S.6.3.b.**

W/LREs and indicators that are; (1) in the same housing, or (2) permanently hard wired together, or (3) sealed with a physical seal or an electronic link, shall have markings that comply with Section 1, Markings - Applicable to Indicating, W/LREs and Complete Scales. This does not apply to indicating elements that have no input or effect on W/LRE calibrations or configurations.

W/LREs that are not permanently attached to the indicator may be interfaced with many different indicators. Consequently, these W/LREs must be marked with information that clearly identifies the manufacturer, the model, and the capacity of the W/LRE.

Since the United States permits indicating and W/LREs to be evaluated separately with different indicating and W/LREs to be assembled at the time of scale installation, additional marking requirements were adopted in 1987. To facilitate the proper installation of equipment and to permit verification by the enforcement official, a W/LRE not permanently attached to an indicating element must be marked with:

1. its accuracy class,
2. the maximum number of scale divisions, $n_{max}$, and
3. minimum verification scale division, $e_{min}$, for which the W/LRE complies with the applicable requirements.

W/LREs not permanently attached to an indicating element shall be clearly and permanently marked with:

4.1. The nominal capacity of the W/LRE. **Yes** ☐ **No** ☐ **N/A** ☐

4.2. Its accuracy class. Indicate class: _____ **Yes** ☐ **No** ☐ **N/A** ☐

4.3. The maximum number of scale divisions for which it complies with requirements. **Yes** ☐ **No** ☐ **N/A** ☐
The preferred abbreviation or symbol is $n_{max}$.

4.4. The minimum verification scale division for which it complies with requirements. **Yes** ☐ **No** ☐ **N/A** ☐
The preferred abbreviation or symbol is $e_{min}$.

| | | |
|---|---|---|
| 4.4. | The minimum verification scale division for which it complies with requirements. The preferred abbreviation or symbol is $e_{min}$. | **Yes** ☐ **No** ☐ **N/A** ☐ |
| 4.5. | The W/LRE shall be marked with the operating temperature range if the temperature range is other than 14 °F to 104 °F (–10 °C to 40 °C). | **Yes** ☐ **No** ☐ **N/A** ☐ |

## 76. List of Acceptable Abbreviations/Symbols

| Device Application | Term | Acceptable | Not Acceptable |
|---|---|---|---|
| **General:** | | | |
| **Values Defined:** | | | |
| ***Exceptions to Gen'l Tables Of W&M, HB44:** | | | |
| **Weighing and Indicating Elements:** | | | |
| | maximum number of scale divisions | $n_{max}$ | N |
| | Section Capacity | Sec C or Sec Cap | SC |
| **W/LREs** | minimum value of verification scale division | $e_{min}$ | E |
| **Load Cells** | maximum number of scale divisions | $n_{max}$ | N |
| | single or multiple cell applications | S = Single; M = Multiple | |
| | load cell verification interval | $v_{min}$ | V |

## Attachment for Agenda Item 13

**8.2. Additional criteria for vehicle scales, railway track scale, combination vehicle/railway track scale, and other platform scales greater that 200 000 lb.**

A CC will apply to all models having:

e. **spans** between sections of not more than 20 % greater than the equipment evaluated; (for vehicle scale no greater than the device evaluated)

**Notes for e:**

1. On a combination Vehicle /Railway Track Scale, a test of the CLC for the vehicle portion of the scale is not required provided the scale has been evaluated as a Railway Track Scale.

2. The device must be evaluated using the smallest $e_{min}$ value that will be listed on the certificate. This may require the use of a multiple range weight indicator for combination vehicle/railway track scales.

3. The CLC for the vehicle scale portion of the device must not exceed the maximum test weight used for the section test section capacity of the railway track scale. The CLC listed on the CC shall be no greater than what would be permitted in Section 8. d.).

## Attachment for Agenda Item 14

**E. Modification of Type** (DES-12-13)

**9. Adding a rotary dump feature/option/modification to a railway track scale** requires an evaluation to be listed on a new or existing CC.

**69a. Additional Tests for Railway Track Scales with a "Rotary Dump" Feature: Repeatability Test**

In addition to the tests in Section 69, an additional "return to zero" and "section" test using the available test weight(s) shall be conducted on railway track scales with a rotary dump feature.

69a.1 After the strain-load test(s) have been completed according to Section 69.7: **Yes ☐ No ☐ NA ☐**

1. With the zero-tracking mechanism disabled, zero the indicator.
2. Move a loaded car on to the scale and record the gross weight.
3. Dump the loaded car using all the installed equipment that is used in the dumping process including retarders, vibrators, car ejector, etc., and record the tare weight.
4. Then move the empty car off the scale.

The indications shall return to zero within applicable tolerances.

69a.2 To verify repeatability of the scale accuracy, **Yes ☐ No ☐ NA ☐**

1. Rezero the scale if necessary;
2. Perform a complete section test in both directions using the same maximum test weight(s) used in paragraph 69.5.

The results of the section test after dumping a loaded car shall repeat the indications of the initial test within acceptance tolerances.

## Attachment for Agenda Item 16

| | |
|---|---|
| 46.1.1. | A separate continuous display of tare. |
| 46.1.2. | The device has selectable GROSS, TARE, and NET weight display modes with proper descriptors for this information. |
| 46.1.3. | The device has selectable GROSS and NET weight display modes with proper descriptors for this information. |
| 46.1.4. | The display indicates only the net weight and a NET legend or annunciator appears when a tare weight is entered. Gross weight is displayed when the tare weight entry is zero and the NET legend or annunciator is off. |
| ~~46.1.5.~~ | ~~A lighted legend or annunciator of TARE ENTERED or words that clearly state similar statement is used to indicate that a tare value has been entered and the display indicated net weight.~~ |
| 46.2. | An entry of "zero" tare should not ~~activate the TARE ENTERED annunciator or~~cause the display to automatically switch the NET display mode. (Scales equipped with a continuous tare display or tare display mode will indicate zero when the tare weight entry is zero; however, the entry of zero tare must not cause the display to automatically switch to the net mode.) |

# Appendix B

## 2006 NTETC Weighing Sector Meeting Attendees

| First Name | Last Name | Organization | E-mail Address |
|---|---|---|---|
| William | Bates | USDA, GIPSA, FMD, PPB | william.e.bates@usda.gov |
| Steven | Beitzel | Systems Associates, Inc | sjbeitzel@systemassoc.com |
| Andrea | Buie | Maryland Department of Agriculture | buieap@mda.state.md.us |
| Luciano | Burtini | Measurement Canada | burtini.luciano@ic.gc.ca |
| Steven | Cook | NIST, Weights & Measures Division | steven.cook@nist.gov |
| Scott | Davidson | Mettler Toledo | scott.davidson@mt.com |
| Terry | Davis | Kansas Department of Agriculture/W&M Division | tdavis@kda.state.ks.us |
| Robert K. | Feezor | Norfolk Southern Corporation | rkfeezor@mindspring.com |
| William | Fishman | New York Bureau of Weights & Measures | Bill.fishman@agmkt.state.ny.us |
| Darrell | Flocken | Mettler-Toledo, Inc. | darrell.flocken@mt.com |
| William G. | GeMeiner | Union Pacific Railroad | wgemeiner@up.com |
| Paul | Hadyka | USDA, GIPSA, FGIS | paul.hadyka@usda.gov |
| Scott | Henry | NCR Corporation | scott.henry@ncr.com |
| Richard | Harshman | NIST, Weights and Measures Division | richard.harshman@nist.gov |
| Ken | Jones | California Division of Measurement Standards | kjones@cdfa.ca.gov |
| Takashi | Kawazoe | New Brunswick International, Inc. | TKService@nbidigi.com |
| Stephen | Langford | Cardinal Scale Manufacturing Co. | slangford@cardet.com |
| Jean | Lemay | Measurement Canada | lemay@ic.gc.ca |
| Paul | Lewis | Rice Lake Weighing Systems, Inc. | paulew@rlws.com |
| Todd | Lucas | Ohio Department of Agriculture | lucas@mail.agri.state.oh.us |
| L. Edward | Luthy | Brechbuhler Scales Inc | eluthy@bscales.com |
| Nigel | Mills | Hobart Corporation | nigel.mills@hobartcorp.com |
| Don | Onwiler | Nebraska Division of Weights & Measures | donwiler@agr.ne.gov |
| Stephen | Patoray | NCWM | spatoray@mgmtsol.com |
| Kenneth | Ramsburg | Maryland Department of Agriculture | |
| Byron | School | USDA, GIPSA, FMD, PPB | Byron.C.School@usda.gov |
| Louis | Straub | Fairbanks Scales, Inc. | strauble@yahoo.com |
| Otto | Warnlof | | warnlof@aol.com |
| John | Wong | Teraoka Weigh-Systems P/L | john@teraoka.com.sg |
| Jesus | Zapien | A&D Engineering, Inc. | jzapien@andweighing.com |

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# Appendix C

## Attachments

## Attachment for Agenda Item 5

| **NCWM Form 15**<br>**Proposal to a Standing Committee**<br>**Committee: Specifications and Tolerances** | |
|---|---|
| Date: October 16, 2006 | Regional Association: SWMA |
| Name/Address of Contact Persons:<br>Steven Cook<br>Weighing Sector NIST Technical Advisor<br>NIST Weights and Measures Division<br>Attention: Specifications and Tolerances Committee<br>Phone: (301) 975-4004 Fax: (301) 975-8091<br>e-mail: steven.cook@nist.gov | Regional Actions: (votes for and against) |
| **Please Attach Additional Pages and Information as Needed** | |

**Proposal:** Amend Handbook 44 – Appendix D Definitions as follows:

Amend the following definition for tare mechanism:

**Tare Mechanism.** A mechanism (including a tare bar) designed for determining or balancing out the weight of packaging material, containers, vehicles, or other materials that are not intended to be included in net weight determinations and setting the indication to zero when the tare object is on the load-receiving element:

- by reducing the weighing range for net loads [e.g. subtractive tare (e.g., 15 kg Gross – 5 kg Tare = 10 kg maximum net weight)], or
- without altering the weighing range for net load on mechanical scales [additive tare mechanism (e.g., tare bar on a mechanical scale with a beam indicator)].

The tare mechanism may function as:
- a non-automatic mechanism (load balanced by an operator),
- a semi-automatic mechanism (load balanced automatically following a single manual command),
- an automatic mechanism where the load balanced automatically without the intervention of an operator. An automatic tare mechanism is only suitable for indirect sales to the customer (e.g. prepackaging scales).

Add the following new definitions:

**Gross Weight Value.** Indication or recorded representation of the weight of a load on a weighing device, with no tare mechanism in operation.

**Net Weight.** See the current edition of NIST Handbook 130 Uniform Weights and Measures Law Section 1.10.

**Net Weight Value.** Indication or recorded representation of the weight of a load placed on a weighing device after the operation of a tare mechanism.

**Tare.** The weight of packaging material, containers, vehicles, or other materials that are not intended to be part of the commodity included in net weight determinations.

**Tare Weight Value.** The weight value of a load determined by a tare mechanism.

**Problem/Justification:**
The Scales Code in Handbook 44 has very few requirements for the operation, indications, and recorded representations, specifically for tare. These requirements include paragraphs S.2.1.6. Combined Zero-Tare (0/T) Key, S.2.3. Tare., S.2.3.1. Monorail Scales Equipped with Digital Indications, and T.N.2.1. General (Tolerances). NTEP has further developed type evaluation criteria for tare based on the reference Handbook 44 paragraphs, General Code paragraph G-S.2. Facilitation of Fraud, and other General Code paragraphs for indicating and recording elements and recorded representations. It has increasingly become difficult to support the NTEP evaluation criteria citing paragraph G-S.2. since it is general in nature and subject to multiple interpretations. Additionally, the general nature of G-S.2. makes it difficult for weights and measures officials, device manufacturers, and device owners and operators to be aware of the tare requirements that have been agreed upon by the National Type Evaluation Technical Committee (NTETC) Weighing Sector. (Note: The Weighing Sector is comprised of weight and measures officials, device manufacturers, and NIST, USDA, and Measurement Canada).

**Background:** In 2006, the NTETC Weighing Sector formed a small Work Group (WG) to review "Tare" operation and requirements, and make recommendations on how tare is applied to single range, multiple range, and multi-interval scale operation. The WG was also asked to develop a recommendation(s) for changes to Publication 14 and Handbook 44 and provide the Weighing Sector guidance on checklist requirements.

The WG, having met on five occasions through conference calls, developed a list of action items including proposed changes to NIST Handbook 44. The Weighing Sector, at its 2006 meeting, reviewed the list of action items and agreed the WG should submit their proposals to amend Handbook 44 Appendix D by amending the term "tare mechanism" and adding new tare definitions to ensure a uniform understating of the terminology used in Handbook 44.

Additionally, the "tare" WG is currently developing proposed recommendations to amend the Handbook 44 tare requirements that will increase the accuracy of net weight determinations, clearly state what is permitted for indication and recorded representations of net and tare weights, and identify tare weights that are determined at the time objects are weighed or tare weights that are determined prior to the time the objects are weighed (e.g., semiautomatic and stored tares). Adoption of the above proposal to amend Appendix D will facilitate developing specific language for Handbook 44 specifications, test notes, and tolerances for different types of tare (e.g., tare, preset tare, percentage tare, etc.).

**Other Contacts:** (Provide position statements, comments, etc. from names and addresses of individuals, firms, manufacturers, and/or trade associations included in developing the proposal.)

**Other Reasons For**: (If none, please indicate none have emerged.)
None have emerged

**Other Reasons Against**:
None have emerged

**Additional Considerations:** (provide cost estimates and state the anticipated benefits for all parties or indicate how the proposal may affect other requirements, programs, etc.)

| **Attachments:** (list the accompanying documents, data, studies etc.) | **Suggested Action**: (Be specific on what action the committee should take on the item.) |
|---|---|
| A listing and original source material for the proposed changes to Appendix D from the NTETC Weighing Sector Tare WG. | Recommend NCWM ☑Adoption ☐ Withdraw<br>☐ Developing Item<br>☐ Informational Item<br>☐ Other (Please describe) |

**NCWM Form 15**
**Proposal to a Standing Committee**
**Committee: Specifications and Tolerances**

| | |
|---|---|
| Date: October 16, 2006 | Regional Association: SWMA |
| Name/Address of Contact Persons:<br>Steven Cook<br>NIST Weights and Measures Division<br>Attention: Specifications and Tolerances Committee<br>Phone: (301) 975-4004 Fax: (301) 975-8091<br>e-mail: steven.cook@nist.gov | Regional Actions: (votes for and against) |

Please Attach Additional Pages and Information as Needed

**Proposal:** Amend paragraph S.1.1. (b) as follows:

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

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

(b) A digital indicating device shall either automatically maintain a "center-of-zero" condition to ± ¼ scale *division or less, or have an auxiliary or supplemental "center-of-zero" indicator that defines a zero balance condition to ± ¼ of a scale division or less. The auxiliary or supplemental "center-of-zero" indicator may be operable with a zero net weight indication.*

*[Nonretroactive as of January 1, 1993]*
(Amended 1992 and 200X)

**Problem/Justification:**
The Scales Code in Handbook 44 has very few requirements for the operation, indications, and recorded representations, specifically for the use and performance of tare mechanisms used in weighing devices. These requirements include paragraphs S.2.1.6. Combined Zero-Tare (0/T) Key, S.2.3. Tare., S.2.3.1. Monorail Scales Equipped with Digital Indications, and T.N.2.1. General (Tolerances). NTEP has further developed type evaluation criteria for tare based on the reference Handbook 44 General Code paragraph G-S.2. Facilitation of Fraud and other General Code paragraphs for indicating and recording elements and recorded representations. It has increasingly become difficult to support the NTEP evaluation criteria citing paragraph G-S.2. since it is general in nature and subject to multiple interpretations. Additionally, the general nature of G-S.2. makes it difficult for weights and measures officials, device manufacturers, and device owners and operators to be aware of the tare requirements that have been agreed upon by the National Type Evaluation Technical Committee (NTETC) Weighing Sector that are published in NCWM Publication 14. (Note: The Weighing Sector is comprised of weight and measures officials, device manufacturers, and NIST, USDA, and Measurement Canada).

An example of an NTEP interpretation is that a device may display a "center-of-zero" indication with a load on the scale provided that the load on the scale has been balanced off by the tare mechanism and the resultant zero net indication is within ± ¼ scale division.

**Background:** In 2006, the NTETC Weighing Sector formed a small Work Group (WG) to review "Tare" operation and requirements and make recommendations on how tare is applied to single range, multiple range, and multi-interval scale operation. The WG was also asked to develop a recommendation(s) for changes to Publication 14 and Handbook 44 and provide the Weighing Sector guidance on checklist requirements.

The WG, having met on five occasions through conference calls, developed a list of action items including proposed changes to NIST Handbook 44. The Weighing Sector, at its 2006 meeting, reviewed the list of action items and agreed with the WG should submit its proposals to amend Handbook 44 Scales Code paragraph S.1.1.1.(b) Digital Indicating Elements to clarify that an auxiliary or supplemental "center-of-zero" indicator is permitted with a load on the scale provided the object used for tare has been balanced off by the tare mechanism and the resultant zero net indication is within ± ¼ scale division.

<table>
<tr><td colspan="2">Additionally, the “tare” WG is currently developing proposed recommendations to amend the Handbook 44 tare requirements that will increase the accuracy of net weight determinations, clearly state what is permitted for indicated and recorded representations of net and tare weights, and identify tare weights that are determined at the time objects are weighed or tare weights that are determined prior to the time the objects are weighed (e.g., semiautomatic and stored tares). Adoption of the above proposal to amend Appendix D will facilitate developing specific language for Handbook 44 specifications, test notes, and tolerances for different types of tare (e.g., tare, preset tare, percentage tare, etc.).</td></tr>
<tr><td colspan="2">Other Contacts: (Provide position statements, comments, etc. from names and addresses of individuals, firms, manufacturers, and/or trade associations included in developing the proposal.)</td></tr>
<tr><td colspan="2">Other Reasons For: (If none, please indicate none have emerged.)</td></tr>
<tr><td colspan="2">Other Reasons Against: None have emerged</td></tr>
<tr><td colspan="2">Additional Considerations: (provide cost estimates and state the anticipated benefits for all parties or indicate how the proposal may affect other requirements, programs, etc.)</td></tr>
<tr><td>Attachments: (list the accompanying documents, data, studies etc.)</td><td>Suggested Action: (Be specific on what action the committee should take on the item.)<br>Recommend NCWM ☑ Adoption ☐ Withdraw<br>☐ Developing Item<br>☐ Informational Item<br>☐ Other (Please describe)</td></tr>
</table>

**NCWM Form 15**
**Proposal to a Standing Committee**
**Committee: Specifications and Tolerances**

| | |
|---|---|
| Date: October 16, 2006 | Regional Association: SWMA |
| Name/Address of Contact Persons:<br>Steven Cook<br>NIST Weights and Measures Division<br>Attention: Specifications and Tolerances Committee<br>Phone: (301) 975-4004 Fax: (301) 975-8091<br>e-mail: steven.cook@nist.gov | Regional Actions: (votes for and against) |

Please Attach Additional Pages and Information as Needed

**Proposal: Add a new note to Scales Code paragraph S.1.2.1. as follows:**

***S.1.2.1. Weight Units.*** *- Except for postal scales, a digital-indicating scale shall indicate weight values using only a single unit of measure. Weight values shall be presented in a decimal format with the value of the scale division expressed as 1, 2, or 5, or a decimal multiple or submultiples of 1, 2, or 5.*

**Note:** The requirement that the value of the scale division be expressed as 1, 2, or 5, or a decimal multiple or submultiples of 1, 2, or 5 does not apply to net weights that are calculated from gross and tare weight indications where the scale value of the gross weight is different than the scale value of the tare weight(s) on multi-interval or multiple range scales. For example, a scale indicating in 2 kg divisions in the lower range or segment and 5 kg divisions in the higher range or segment may result in net values ending in three (3) or eight (8) or a scale indicating in 20 lb divisions in the lower range and 50 lb divisions in the higher range or segment may result in net values in 30 or 80.
*[Nonretroactive as of January 1, 1989]*
(Added 1987) (Amended 200X)

**Amend Scales Code paragraph T.N.2.1. as follows:**

**T.N.2.1. General. –** The tolerance values are positive (+) and negative (–) with the weighing device adjusted to zero at no load. When tare is used, the tolerance values are applied from the tare zero reference (zero net indication); the tolerance values apply to the net weight indication for every possible tare load using certified test loads ~~only~~.
(Amended 200X)

**Add a new note to the AWS Code paragraph S.1.2.1. as follows:**

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

(a) 1, 2, or 5; or

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

**Note:** The requirement that the value of the scale division be expressed as 1, 2, or 5, or a decimal multiple or submultiples of 1, 2, or 5 does not apply to net weights that are calculated from gross and tare weight indications where the scale value of the gross weight is different than the scale value of the tare weight(s) on multi-interval or multiple range scales. For example, a scale indicating in 2 g divisions in the lower range or segment and 5 g divisions in the higher range or segment may result in net values ending in three (3) or eight (8).
(Amended 200X)

**Amend Scales Code paragraph T.N.2.1. as follows:**

**T.2.1. General. –** The tolerance values are positive (+) and negative (–) with the weighing device adjusted to zero at

no load. When tare is used, the tolerance values are applied from the tare zero reference (zero net indication); the tolerance values apply to the net weight indication for every possible tare load using certified test loads ~~only~~. (Amended 200X)

**Problem/Justification:**

In 2006, the NTETC Weighing Sector formed a small WG to review "Tare" operation and requirements in general and make recommendations on how tare is applied to single range, multiple range, and multi-interval scale operation. The WG was asked to develop a recommendation(s) for changes to Publication 14, Handbook 44, and Handbook 130 (if necessary) and provide the Weighing Sector guidance on checklist requirements.

The Tare WG discussed the problems of rounding tare on multi-interval and multiple range scales when the net weight was in a different weighing range than the tare weight. Whenever gross and tare weights fall in different weighing segments on a multi-interval scale or in different weighing ranges on multiple range scales the scale divisions for the gross and tare weights differ. The net weight must be in mathematical agreement with the gross and tare weights that are indicated and recorded, (i.e., gross – tare = net).

This becomes a problem when tare vales are rounded to the net weight scale division that is larger than the scale division of the tare value. For example, a 0.004 lb tare in a weighing range or segment with 0.002 lb intervals in the lower weighing range or segment may round to zero when the net weight falls in the upper weighing range with 0.01 lb intervals (10.05 lb Gross - 0.004 lb Tare = 10.046 lb which rounds to 10.05 lb Net). This results in a transaction where an object being sold or purchased on the basis of gross weight or by taking insufficient tare.

**Essentially, the rounding of tare in either direction from a smaller scale division to a larger scale division provides a less accurate net weight.**

This proposed note to paragraph S.1.2.1. allows the display and printing of net weight values in divisions other than the scale division used in the display of gross weight.

The proposed amendment to Scales Code paragraph T.N.2.1. and AWS Code paragraph T.2.1. is intended to clarify that Table 6 tolerances also apply to net weight indications regardless of the gross load on the scale. During the Tare WG discussions, OIML R 76 was consulted for possible areas where Handbook 44 could be aligned with international recommendations and noted that Handbook 44 did not specifically state that tolerances also apply to net load indications. The current language in Handbook 44 states the tolerances are applied from the tare zero reference when tare is used. The group believes that the language in Handbook 44 is equivalent to OIML R 76, but that the language in Handbook 44 could easily be restated to clarify that tolerances apply to net weight indications.

**Other Contacts:** (Provide position statements, comments, etc. from names and addresses of individuals, firms, manufacturers, and/or trade associations included in developing the proposal.)

**Other Reasons For**: (If none, please indicate none have emerged.)
None have emerged

**Other Reasons Against**:
None have emerged

**Additional Considerations:** (provide cost estimates and state the anticipated benefits for all parties or indicate how the proposal may affect other requirements, programs, etc.)

| **Attachments**: (list the accompanying documents, data, studies etc.) | **Suggested Action**: (Be specific on what action the committee should take on the item.)<br>Recommend NCWM ☑ Adoption ☐ Withdraw<br>☐ Developing Item<br>☐ Informational Item<br>☐ Other (Please describe) |
|---|---|

## Attachment for Agenda Item 7

<table>
<tr><th colspan="2">NCWM Form 15<br>Proposal to a Standing Committee<br>Committee: Specifications and Tolerances</th></tr>
<tr><td>Date: October 16, 2006</td><td>Regional Association: SWMA</td></tr>
<tr><td>Name/Address of Contact Persons:<br>NTETC Weighing Sector<br>Steven Cook, NIST Technical Advisor<br>NIST Weights and Measures Division<br>NIST Technical Advisor NTETC Weighing Sector<br>Phone: (301) 975-4004 Fax: (301) 975-8091<br>e-mail: steven.cook@nist.gov</td><td>Regional Actions: (votes for and against)</td></tr>
<tr><td colspan="2">Please Attach Additional Pages and Information as Needed</td></tr>
<tr><td colspan="2">Proposal: Amend the AWS Code (AWS) Table S.7. Notes for Table S.7.a. Note 5 as follows:<br><br>5. Required only on automatic weighing systems if the temperature range on the NTEP CC <u>is narrower than and within</u> <s>other than</s> −10 °C to 40 °C (14 °F to 104 °F).<br>(Amended 2007)</td></tr>
<tr><td colspan="2">Problem/Justification: An NTEP participating laboratory received an application for an automatic weighing system with a marked temperature range larger than the −10 °C to 40 °C temperature range in Handbook 44 AWS Table S.7. Note 5. The participating laboratory performed the tests over the larger temperature range. However, they became concerned that manufacturers would infer that AWSs with the larger temperature ranges would be a higher quality device and subsequently a marketing issue. The laboratory was also concerned that testing at higher and higher temperature ranges would be a health and safety concern for the evaluators and that the larger temperature ranges would exceed the testing capabilities of the NTEP laboratories. It was also noted that the marking requirements in Scales Code Table S.6.3.b. Notes for Table S.6.3.a. Note 5 states that the temperature range only had to be marked if the scale had a temperature range that was narrower than an within −10 °C to 40 °C.<br><br>This issue was discussed by the NTETC Weighing Sector during their 2005 and 2006 Annual Meetings. The Sector reviewed the 1991 and 1999 S&T Committee discussions regarding temperature range marking requirements and agreed to align the AWS Code with the Scales Code marking requirements for temperature range. The NIST Technical Advisor also recommended that similar amendments be made to other Section 2 (Weighing) Codes; however, the Sector stated that the other codes need additional evaluation and should be submitted to the S&T through the normal process.</td></tr>
<tr><td colspan="2">Other Contacts: (Provide position statements, comments, etc. from names and addresses of individuals, firms, manufacturers, and/or trade associations included in developing the proposal.)</td></tr>
<tr><td colspan="2">Other Reasons For: (If none, please indicate none have emerged.)<br>None have emerged</td></tr>
<tr><td colspan="2">Other Reasons Against:<br>None have emerged</td></tr>
<tr><td colspan="2">Additional Considerations: (provide cost estimates and state the anticipated benefits for all parties or indicate how the proposal may affect other requirements, programs, etc.)</td></tr>
<tr><td>Attachments: (list the accompanying documents, data, studies etc.)<br><br>Additional background information from the 1991 and 1999 S&T Committee Reports on the markings for temperature ranges in the Scales Code.</td><td>Suggested Action: (Be specific on what action the committee should take on the item.)<br><br>Recommend NCWM ☑ Adoption ☐ Withdraw<br>☐ Developing Item<br>☐ Informational Item<br>☐ Other (Please describe)</td></tr>
</table>

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