

Report of the Specifications and Tolerances Committee

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300 INTRODUCTION

The Specifications and Tolerances (S&T) Committee (“Committee”) will address the following items at its Interim Meeting. All items are listed below in Table A by Reference Key Number. The headings and subjects apply to NIST Handbook 44, "Specifications, Tolerances, and Other Technical Requirements for Weighing and Measuring Devices." The Appendices to the Report are listed in Table B. The acronyms for organizations and technical terms used throughout the agenda are identified in a glossary in Table C. In some cases background information will be provided for an item. The fact that an item appears on the agenda does not mean that the item will be presented to the Conference for a vote. The Committee will review its agenda at the Interim Meeting and may withdraw some items, present some items for information meant for additional study, issue interpretations, or make specific recommendations for change to NIST Handbook 44 which will be presented for a vote at the Annual Meeting.

The recommendations are statements of proposals and are not necessarily those of the Committee. Suggested revisions to the handbook are shown in **bold face print** by ~~striking out~~ information to be deleted and underlining information to be added. Requirements that are proposed to be nonretroactive are printed in **bold-faced italics**.

Note: The policy of NIST is to use metric units of measurement in all of its publications; however, recommendations received by the NCWM technical committees have been printed in this publication as they were submitted and may, therefore, contain references to inch-pound units.

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**Table C
Glossary of Acronyms**

AWS	Automatic Weighing Systems	NW&SA	National Weighing and Sampling Association
CC	Certificate of Conformance	NCWM	National Conference on Weights and Measures, Inc.
CWMA	Central Weights and Measures Association	NEWMA	Northeastern Weights and Measures Association
EPO	Examination Procedure Outline	NIST	National Institute of Standards and Technology
GS	Grain Analyzer Sector	NTEP	National Type Evaluation Program
GMM	Grain Moisture Meters	NTETC	National Type Evaluation Technical Committee
GPMA	Gasoline Pump Manufacturers Association	RMFD	Retail Motor-Fuel Dispenser
HB 44	NIST Handbook 44	SI	International System of Units
HB 130	NIST Handbook 130	SMA	Scale Manufacturers Association
LMD	Liquid-Measuring Device	SWMA	Southern Weights and Measures Association
LPG	Liquefied Petroleum Gas	WMD	Weights and Measures Division
MDMD	Multiple Dimension Measuring Devices	WS	Weighing Sector
MFM	Mass Flow Meter	WWMA	Western Weights and Measures Association
MMA	Meter Manufacturers Association	USNWG	NIST/OIML U.S. National Working Group
MS	Measuring Sector	VTM	Vehicle-tank Meters
OEM	Original Equipment Manufacturer		
<p>“Handbook 44” (HB 44) means the 2008 Edition of NIST Handbook 44 “Specifications, Tolerances, and Other Technical Requirements for Weighing and Measuring Devices”</p> <p>“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.”</p>			
<p>Note: NIST does not imply that these acronyms are used solely to identify these organizations or technical topics.</p>			

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

310 GENERAL CODE

310-1 Appendix D – Definition of Equipment

Source: NIST Weights and Measures Division

Recommendation: Add a new definition for “equipment” to Appendix D as follows:

equipment. Weights, measures, and weighing and measuring devices, instruments, elements, and systems or portion thereof, used or employed in establishing the size, quantity, value, extent, area, composition, constituent value, or measurement of quantities, things, produce, or articles for distribution or consumption, purchased, offered, or submitted for sale, hire, or award, or in computing any basic charge or payment for services rendered on the basis of weight or measure. [1.10, 2.20, 2.21, 2.22, 2.24, 3.30, 3.31, 3.32, 3.33, 3.34, 3.35, 3.38, 4.40, 5.51, 5.56.(a), 5.56.(b), 5.57, 5.58, 5.59]

Discussion: The Committee agreed that there is a need to define the term “equipment” since the term is used throughout HB 44 device codes. The term can be misinterpreted in paragraph G-S.2. unless there is a specific definition added to Appendix D to clarify which parts or portions of a device or system must comply. The Committee split S&T Item 310-1 into two separate items: S&T Item 310-1A (a proposal to modify paragraph G-S.2.) and S&T Item 310-1B (an information item that recommends a new definition for “equipment” as used in HB 44). The Committee noted that the term equipment does not appear in all HB 44 Codes. The Committee recommended that Item 310-1B be carried over to allow sufficient time for a review of the proposed definition.

320 SCALES

320-1 S.1.1.1.(b) Digital Indicating Elements

Source: National Type Evaluation Technical Committee (NTETC) Weighing Sector

Recommendation: At the 2007 Annual Meeting, the Committee modified the proposed language developed after the 2007 Interim Meeting. The recommendation (as modified by the Committee) currently under consideration by the Committee is to amend S.1.1.1. as follows:

S.1.1.1. Digital Indicating Elements.

- (a) A digital zero indication shall represent a balance condition that is within $\pm 1/2$ the value of the scale division.
- (b) *A digital indicating device shall either automatically maintain a "center-of-zero" condition to $\pm 1/4$ scale division or less, or have an auxiliary or supplemental "center-of-zero" indicator that defines a zero balance condition to $\pm 1/4$ of a scale division or less.
[Nonretroactive as of January 1, 1993]*

Note: The "center-of-zero" indication may also work when zero is indicated for gross load zero, or after a tare operation.
(Amended 1992 **and 200X**)

Discussion: Scales Code requirements do not include sufficiently detailed language to identify all types of tare, define how tare features must operate, or specify the net and tare values a scale must indicate and record. Current HB 44 requirements that address tare 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). This Weighing Sector proposal is the first of several proposed modifications to HB 44 requirements intended to clarify the suitability of tare features that are already widely used in commercial applications.

The Weighing Sector developed criteria used to type evaluate tare features based on General Code paragraph G-S.2. Facilitation of Fraud and other requirements that apply to indicating and recording elements and recorded representations. NTEP laboratories find that it has become increasingly difficult to base its compliance decisions on paragraph G-S.2. solely because the general nature of the language results in multiple interpretations. Type evaluation criteria are published in NCWM Publication 14; however, this document is not in wide distribution in the weights and measures community and only a limited number of weights and measures officials, device manufacturers, and device owners and operators are regular participants in Weighing Sector meetings where tare evaluation criteria are developed and discussed. Additionally, it is difficult for parties responsible for the design, use, and test of the tare feature to interpret and apply technical requirements published in Publication 14. This results in differing interpretations of HB 44 requirements.

In 2006, the NTETC Weighing Sector formed a Tare Work Group (WG) to review existing tare requirements and make recommendations about how tare is to operate on a single range scale, a multiple range scale, and a multi-interval scale. The work group was also asked to develop, where necessary, recommendations for changes to Publication 14, HB 44, and HB 130 and to provide guidance to the Weighing Sector on type evaluation requirements.

The WG is currently developing proposals to amend HB 44 requirements to:

- (1) ensure that a tare feature operates in a manner that increases the accuracy of net weight determinations,
- (2) clearly state what information and values are permitted and required for indicated and recorded representations of net weight and tare weight, and
- (3) identify the types (e.g., semiautomatic and stored tares) of tare weight values that are determined at the time objects are weighed or tare weight values that are determined prior to the time objects are weighed.

The Weighing Sector agreed the WG's proposal to amend paragraph S.1.1.1.(b) further clarifies that an auxiliary or supplemental "center-of-zero" indication is permitted with a load on the scale provided tare material is zero-balanced off by the tare mechanism and prescribes that the acceptable limits of accuracy are within $\pm 1/4$ scale division for the resulting zero net indication. The Weighing Sector recommends the adoption of the proposal as an important step to promoting the development of specific language in HB 44 for specifications, test notes, and tolerances for different types of tare (e.g., tare, preset tare, percentage tare, etc.).

The Committee considered the Weighing Sector's proposal to modify paragraph S.1.1.1. as follows:

S.1.1.1. Digital Indicating Elements.

- (a) A digital zero indication shall represent a balance condition that is within $\pm 1/2$ the value of the scale division.
- (b) *A digital indicating device shall either automatically maintain a "center-of-zero" condition to $\pm 1/4$ scale division or less, or have an auxiliary or supplemental "center-of-zero" indicator that defines a zero balance condition to $\pm 1/4$ 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**)

The SWMA supported the intent of the Weighing Sector's proposal, but agreed that some modifications to the text in paragraph S.1.1.1. were needed to clarify that the center-of-zero indicator may be operable when a zero condition exists in the net weight mode. The SWMA recommended that its alternate proposal move forward as a voting item.

The Committee considered the SWMA's alternate proposal as follows:

S.1.1.1. Digital Indicating Elements.

- (a) A digital zero indication shall represent a balance condition that is within $\pm \frac{1}{2}$ the value of the scale division.
- (b) *A digital indicating device shall either automatically maintain a "center-of-zero" condition to $\pm \frac{1}{4}$ scale division or less, or have an auxiliary or supplemental "center-of-zero" indicator that defines a zero balance condition to $\pm \frac{1}{4}$ of a scale division or less. **The auxiliary or supplemental "center-of-zero" indicator may be operable with a zero condition in the net weight mode.***
[Nonretroactive as of January 1, 1993]

(Amended 1992 **and 200X**)

During the Committee's review of the SWMA alternate proposal the WMD recommended that the Committee consider that there may be a possible conflict between the SWMA proposal and 2006 NCWM Publication 14 criteria for zero indications in Section 41.5 that prohibits a minus sign from preceding a zero indication.

The SMA supported the Weighing Sector's proposal.

The Committee discussed the possibility of using language in the Weighing Sector's and the SWMA proposals to modify paragraph S.1.1.(b) because together the proposals included two of three conditions that must be met for a center-of-zero indication when the scale is in a zero balance condition.

The Committee agreed the best approach to developing language to address the operation of a center-of-zero indication was to request that the NIST Technical Advisor to the Weighing Sector rework paragraph (b) using language similar to Publication 14 criteria that specifies how the center-of-zero must operate at zero gross weight or defines when there can be a zero indication of net weight. The Committee received the alternate proposal to amend S.1.1.1. as shown below and made it a voting item in its 2007 Interim Report since this tare-related item focuses only on clarifying how the center-of-zero indication operates.

S.1.1.1. Digital Indicating Elements.

- (a) ~~A digital zero indication shall represent a balance condition that is within $\pm \frac{1}{2}$ the value of the scale division.~~ **A digital indicating device shall automatically maintain a "center-of-zero" condition to $\pm \frac{1}{4}$ scale division and have an auxiliary or supplemental "center-of-zero" indicator that defines a zero balance condition to $\pm \frac{1}{4}$ of a scale division or less. The "center-of-zero" indication may also work when zero is indicated for:**

- i. gross load zero, or**
ii. after a tare operation.

[Nonretroactive as of January 1, 2007]

- (b) ~~For A Digital Indicating Elements Manufactured Before January 1, 2007. – device shall either automatically maintain a "center-of-zero" condition to $\pm \frac{1}{4}$ scale division or less, or have an auxiliary or supplemental "center-of-zero" indicator that defines a zero balance condition to $\pm \frac{1}{4}$ of a scale division or less.~~ **A digital zero indication shall represent a balance condition that is within $\pm \frac{1}{2}$ the value of the scale division.**

- (c) **For Digital Indicating Elements Manufactured Between January 1, 1993, and January 1, 2007. – A digital indicating device shall either automatically maintain a "center-of-zero" condition to $\pm \frac{1}{4}$ scale division or less, or have an auxiliary or supplemental "center-of-zero" indicator that defines a zero balance condition to $\pm \frac{1}{4}$ of a scale division or less.**

[Nonretroactive as of January 1, 1993]

(Amended 1992 **and 2007**)

At the 2007 NCWM Annual Meeting, the Committee heard testimony from the CWMA, NEWMA, and SMA stating that this item has changed from the original intent to verify that zero tracking could be operable in the net mode, to now include the addition of other language which alters the requirement even more. For example in paragraph S.1.1.1.(a), by stating “and” instead of “or” would make both requirements mandatory. If “or” is used instead of “and” then this proposal lowers the current requirement of $\frac{1}{2} e$ to $\frac{1}{4} e$. The SMA further stated that because proposed paragraph (a) adds a dual requirement that is not consistent with Canadian and OIML requirements. Therefore, the CWMA, NEWMA, and SMA recommended the status of the proposal be changed to informational to allow time for further consideration.

The WMD agreed with the CWMA, NEWMA, and SMA and recommended deleting the additional changes that were added to the proposal (changing “or” to “and,” in addition to requiring all electronic indicators maintain zero to $\frac{1}{4} e$). The WMD suggested that the Committee consider amending the proposal as shown in the recommendation to be more consistent with the original intent of the NTETC Weighing Sector. The WMD also provided the Committee with a second proposal that it may want to consider at a later date to define the zero condition of a scale with a “center-or-zero” annunciator while the scale is in a “sleep mode” if the Committee had chosen to recommend agenda item 320-1 for a vote.

The Committee agreed with comments shown in its 2007 Interim report significantly changes the original intent of the proposal. Additionally, the changes to the center-of-zero indication requirements are in conflict with OIML recommendations and Canadian requirements.

The Committee agreed that the status of the item should be changed to “Informational” and that the first alternate proposal from the WMD become a carry-over item for the 2008 Committee agenda since that text is consistent with the intent of the original proposal from the NTETC Weighing Sector.

The NTETC Weighing Sector will be reviewing this item at their September 6-8, 2007 annual meeting. The NIST Technical Advisor to the Weighing Sector will forward the sector recommendations to the regional weights and measures regional association and the NCWM S&T Committees.

320-2 S.1.2.1. Weight Units and T.N.2.1. General

Source: National Type Evaluation Technical Committee (NTETC) Weighing Sector

Recommendation: Add a new note to paragraph S.1.2.1. and amend paragraph T.N.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 sub-multiple of 1, 2, or 5.

[Nonretroactive as of January 1, 1989]

Note: The requirements that the value of the scale division be expressed only as 1, 2, or 5, or a decimal multiple or submultiples of only 1, 2, or 5 does not apply to net weight indications and recorded representations that are calculated from gross and tare weight indications where the scale division of the gross weight is different from the scale division of the tare weight(s) on multi-interval or multiple range scales.

For example, a scale indicating a tare weight of 2 kg in the lower range or segment and a gross weight of 5 kg in the higher range or segment may indicate a net weight of 3 kg, or a scale indicating a tare weight of 20 lb in the lower range or segment and a gross weight of 50 lb in the higher range or segment may indicate a net weight of 30 lb.

[Nonretroactive as of January 1, 1989]

(Added 1987) (Amended 200X)

S.2.3. Tare. – On any scale (except a monorail scale equipped with digital indications and multi-interval scales or multiple range scales when the value of tare is determined in a lower range), the value of the tare

division shall be equal to the value of the scale division. The tare mechanism shall operate only in a backward direction (that is, in a direction of underregistration) with respect to the zero-load balance condition of the scale. A device designed to automatically clear any tare value shall also be designed to prevent the automatic clearing of tare until a complete transaction has been indicated.**
(Amended 1985)

[*Note: On a computing scale, this requires the input of a unit price, the display of the unit price, and a computed positive total price at a readable equilibrium. Other devices require a complete weighing operation, including tare, net, and gross weight determination*]*
[*Nonretroactive as of January 1, 1983]
(Amended 200X)

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 in use, the tolerance values are applied from the tare zero reference (**zero net indication**); the tolerance values apply to **the net weight indication for any possible tare load using** certified test loads only.
(Amended 200X)

Discussion: In 2006, the NTETC Weighing Sector formed a Tare WG to review existing tare requirements and make recommendations about how tare is to operate on a single range scale, multiple range scale, and multi-interval scale. The WG was also asked to develop, where necessary, recommendations for changes to Publication 14, HB 44, and HB 130, and to provide guidance to the Weighing Sector on related type evaluation requirements.

This proposal, which was developed by the Tare WG and supported by the Weighing Sector, adds a new note to paragraph S.1.2.1. The note recognizes display and printing of net weight values in divisions other than the scale division used in the display of gross weight, resulting in a more accurate net weight determination.

The proposal also amends paragraph T.N.2.1. to clarify that tolerances also apply to net weight indications regardless of the gross load on the scale. The Tare WG reviewed OIML R 76 "Nonautomatic Weighing Instruments" for corresponding requirements to determine if there were areas where HB 44 could be aligned with international recommendations. Based on that review, the WG agreed that HB 44 paragraph T.N.2.1. should be modified to state that tolerances also apply to net load indications.

The Tare WG discussed problems associated with determining the appropriate direction to round tare on multi-interval scales and multiple range scales whenever gross and tare weights fall in different weighing segments on a multi-interval scale or in different weighing ranges on multiple range scales. In these cases, the scale division size for the gross and tare weights differ; however, the net weight must be in mathematical agreement with the gross and tare weights that are indicated and recorded by the device (i.e., gross weight - tare weight = net weight).

The problem arises when the tare weight is rounded up to the next larger scale division where the net weight falls in the higher segment or range. For example, a 0.004 lb tare weight 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:

$$\begin{array}{r} 10.05 \text{ lb Gross Weight} \\ - 0.004 \text{ lb Tare Weight} \\ \hline = 10.046 \text{ lb the Mathematically Correct Net Weight;} \end{array}$$

However, due to rounding of tare weight the device indicates 10.05 lb Net Weight

This results in a transaction where a commodity is bought or sold on the basis of gross weight or an insufficient amount of tare weight is taken and results in a misrepresentation of net weight for the transaction. Essentially, the rounding of tare that falls in a smaller division in either direction (e.g., a 0.015 lb tare weight rounded down to zero or to 0.01 lb or up to 0.02 lb) provides a less accurate net weight.

The Tare WG developed a corresponding proposal for the Automatic Weighing Systems Code to clarify the appropriate scale division values and the application of tolerances to tare weights for those devices (see S&T Item 324-1).

The SWMA supports the recommendation; however, the SWMA also agreed that an additional note should be added to paragraph S.2.3. Tare. The new note proposed for paragraph S.2.3. clarifies that the requirement does not apply to multi-interval scales or multiple range scales when tare is determined in the lower range of those scales.

The WMD agreed that it might be more appropriate if the proposed new note explains that gross weight and calculated tare weight are expressed as an "indicated weight value" rather than as a "scale value." The WMD notes that the proposed SWMA text is necessary to clarify that tare weights are excluded from the requirement that specifies weight values must be the same as the scale division value. However, the SWMA's proposal needs further work to better explain if only part or the entire paragraph does not apply to tare weights indicated on either a multi-interval or multiple range scale and to clarify the relationship of paragraph S.1.2.1. to corresponding paragraph S.2.3. The WMD also asked if it was the SWMA's intent that this newly proposed note be a retroactive or nonretroactive requirement, and if nonretroactive, then what is an appropriate effective date?

The SMA supports the Weighing Sector's proposal, but recommended the proposed new note become a subparagraph of paragraph S.1.2.1. and include a modification to the proposed new text in paragraph T.N.2.1. to require the net weight indication for "any" rather than "every" possible tare load using certified test loads. The Committee agreed to the SMA's recommended changes to paragraph T.N.2.1. and modified the proposal accordingly.

The Committee deliberated at length on this item and S&T Items 320-5 and 320-9, which are all meant to clarify the distinct differences in how various tare features are permitted to operate. The Committee agreed that ultimately neither the buyer nor seller should incur a loss as a result of an inaccurate calculation of a tare weight. Much of the weights and measures community has not had the opportunity to discuss these proposals nor has the Tare WG or Weighing Sector had time to analyze feedback on these proposed changes to the Scales Code and corresponding proposals to change the AWS Code (see Items 324-1 and 324-3). The Committee agreed that all proposals related to the operation of the tare feature should be Information Items to ensure that all aspects of the operation of tare features are adequately addressed and clearly defined for both the public and private sector.

During the 2007 NCWM Annual meeting, the Committee heard comments from the CWMA and NEWMA supporting this item with recommendations to change the word "value" to "division" and incorporating the SWMA recommendation to modify paragraph S.2.3.

NEWMA pointed out that the proposed amendment to S.1.2.1. appears to be permissive and not a requirement and asked if the intent is to prohibit multi-interval and multiple range scales from rounding and indicating calculated net weights in scales divisions to only 1, 2, or 5 when appropriate or allow the rounding the scale divisions of 1, 2, or 5 still allowed? The WMD representative to the NCWM Tare Work Group stated that the intent is for the language to be permissive because there are a significant number of devices with an NTEP CC in the marketplace that round the tare values before calculating net weights.

The Committee made several modifications to the proposal to clarify:

- the examples in the proposed note to paragraph S.1.2.1., and
- that the SWMA proposed modification to the language in S.2.3 for an exception for multi-interval and multiple range scales only applies to the requirement that the value of tare shall be equal the value of the scale division.

The Committee also agreed that the words "scale value" should be changed to "scale division" to be consistent with the terminology currently used in HB 44 and recommends that NIST Technical Advisor forward the amended proposal to the Tare Work Group and NTETC Weighing Sector for their consideration and comment.

The NTETC Weighing Sector will be reviewing the recommendation at their September 6-8, 2007 annual meeting. The NIST Technical Advisor to the Weighing Sector will forward the sector recommendations to the regional weights and measures regional association and the NCWM S&T Committees.

320-3 Appendix D; Definitions for Tare Mechanism, Gross Weight Value, Net Weight, Net Weight Value, Tare, and Tare Weight Value

Source: National Type Evaluation Technical Committee (NTETC) Weighing Sector

Recommendation: Modify the definition for “tare mechanism” and add new definitions for “gross weight value,” “net weight,” “net weight value,” “tare,” and “tare weight value” to Appendix D.

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 for setting the indication to zero when the tare object is on the load-receiving element:**

1. **by reducing the weighing range for net loads (e.g., subtractive tare where $\text{Net Weight} + \text{Tare Weight} \leq \text{Gross Weight Capacity}$), or**
2. **without altering the weighing range for net load on mechanical scales (e.g., additive tare mechanism such as a tare bar on a mechanical scale with a beam indicator).**

The tare mechanism may function as:

1. **a non-automatic mechanism (load balanced by an operator),**
2. **a semi-automatic mechanism (load balanced automatically following a single manual command),**
3. **an automatic mechanism where the load is 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).**

[2.20, 2.24]

(Amended 200X)

Add the following new definitions to Appendix D:

gross weight value. Indication or recorded representation of the weight of a load on a weighing device, with no tare mechanism in operation.[2.20, 2.24]

(Added 200X)

net weight. The term "net mass" or "net weight" means the weight of a commodity excluding any materials, substances, or items not considered to be part of the commodity. Materials, substances, or items not considered to be part of the commodity include, but are not limited to, containers, conveyances, bags, wrappers, packaging materials, labels, individual piece coverings, decorative accompaniments, and coupons, except that, depending on the type of service rendered, packaging materials may be considered to be part of the service. For example, the service of shipping includes the weight of packing materials.

[2.20, 2.24]

(Added 200X)

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. [2.20, 2.24]

(Added 200X)

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. [2.20, 2.24]

(Added 200X)

tare weight value. The weight value of a load determined by a tare mechanism. [2.20, 2.24]

(Added 200X)

Discussion: This Weighing Sector proposal is one of several proposed modifications to HB 44 requirements intended to clarify the acceptable tare features already recognized for use in commercial applications. Scales Code requirements do not include sufficiently detailed language to identify all types of tare, define how tare features must operate, or specify the net and tare values a scale must indicate and record. Current HB 44 requirements that address tare 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).

The Weighing Sector has developed criteria used to type evaluate tare features based on General Code paragraph G-S.2. Facilitation of Fraud and other requirements that apply to indicating and recording elements and recorded representations. NTEP laboratories find that it has become increasingly difficult to base its compliance decisions solely on paragraph G-S.2. because the general nature of the language results in multiple interpretations. Type evaluation criteria are published in NCWM Publication 14; however, this document is not in wide distribution in the weights and measures community. In addition, only a limited number of weights and measures officials, device manufacturers, and device owners and operators are regular participants in Weighing Sector meetings where tare evaluation criteria are developed and discussed. Additionally, it is difficult for parties responsible for the design, use, and test of the tare feature to interpret and apply technical requirements published in Publication 14. This results in differing interpretations of HB 44 requirements.

In 2006, the NTETC Weighing Sector formed a Tare WG to review existing tare requirements and make recommendations about how tare should operate on a single range scale, a multiple range scale, and a multi-interval scale. The WG also was asked to develop, where necessary, recommendations for changes to Publication 14, HB 44, and HB 130, and to provide guidance to the Weighing Sector on type evaluation requirements.

The WG is currently developing proposals to amend HB 44 requirements to:

- a. ensure that a tare feature operates in a manner that increases the accuracy of net weight determinations,
- b. clearly state what information and values are permitted and required for indicated and recorded representations of net weight and tare weight, and
- c. identify the types (e.g., semiautomatic and stored) of tare weight values determined at the time objects are weighed or tare weight values are determined prior to the time objects are weighed.

At its 2006 meeting, the Weighing Sector agreed to submit a proposal to the NCWM S&T Committee to amend HB 44 Appendix D by amending the term "tare mechanism" and adding new tare definitions to ensure a uniform understating of the terminology used in HB 44.

The SWMA supported the proposal, but also believes the wording of the definition for "net weight" (which referenced the HB 130 definition of tare) should appear in Appendix D rather than have the reader refer to NIST HB 130 for that information. Consequently, the SWMA recommended adding the complete definition of "net weight" from HB 130 to the proposal as shown in the recommendation above.

The SMA supported the intent of the proposal, but recommended the proposal should be returned to the Weighing Sector for further development and subsequent review by the regional weights and measures associations.

The WMD noted that there should be a corresponding proposal in the Automatic Weighing Systems (AWS) Code since the terms also apply to those devices. Both proposals should be discussed and eventually voted on as a block.

The Weighing Sector submitted a single proposal (S&T Item 320-9), which included modified and new definitions for tare and related weight values that referenced HB 44 Sections 2.20 Scales and 2.24 Automatic Weighing Systems. The Committee agreed that for procedural reasons a separate corresponding proposal should have appeared in its 2007 S&T Agenda in Section 3.24. for AWS. A separate item is more appropriate because some in the community due to time constraints and interest will focus only on specific device sections in the agenda. Therefore, the Committee developed a separate proposal for automatic weighing systems that now appears in this report as new S&T Item 324-3. For the sake of brevity, the Committee kept the proposed text for both applications under 320-9 to ensure that there is a similar outcome since devices in both Code Sections 2.20 and 2.24 are affected by the definitions. The Committee will consider this item and new S&T Item 324-3 jointly during all future sessions.

The Committee further modified the proposed formula for subtractive tare in subparagraph 1 that appears in the definition of "tare mechanism" to clarify that the combined net and tare net weight value should not exceed the permissible gross weight capacity. The Committee agreed that lengthy discussions on all of the tare proposals demonstrate that although it is necessary to address tare, the matter is too complex to move forward without a more thorough review of all related proposals by the Weighing Sector and weights and measures jurisdictions. Consequently, the Committee recommended this proposal and other related proposals intended to address tare features remain as Information Items for further review and development. The Committee also agreed that all tare related items, when ready, should be presented for voting as a block.

The NTETC Weighing Sector will be reviewing the following revised recommendation of the Tare Work Group at their September 6-8, 2007 annual meeting. The NIST Technical Advisor to the Weighing Sector will forward the sector recommendations to the regional weights and measures regional association and the NCWM S&T Committees.

The Tare Work Group recommends adding to following definitions to above definitions that are already in S&T Agenda Item 320-9

Calculated weight (gross or tare*) value - Calculated sum or difference of more than one measured weight value and/or calculated net value. (* TARE WG Comment – This new HB definition is from the revised version of R 76 and is beyond what is currently required by NTEP)

Tare-balancing mechanism. A tare mechanism with an indication that tare has been taken and without an indication of the tare value (weight) when the instrument is loaded. A negative net weight is assumed to be the tare value when the weighing instrument is unloaded.

Tare-weighing mechanism. A tare balancing mechanism that stores the tare value and is capable of displaying (continuously or upon command) or printing the value whether or not the instrument is loaded.

Preset Tare: A numerical value, representing a weight that is entered into a weighing device (e.g., keyboard, recalling from stored data, or entered through an interface) and is intended to be applied to weighings without determining individual tares.

Preset Tare Mechanism. A part of a weighing system for subtracting a preset tare value from a gross or net weight value and indicating the result of the calculation as a net weight. The weighing range for net loads is reduced accordingly.

Types of preset tare mechanisms include:

- **Keyboard Tare** - The operation of keys on a keyboard; e.g., with a typical 10-key keyboard with values 0 through 9, by the pushing of a key numbered 5, the number 5 is entered as a tare value.
- **Digital Tare** - By the repeated operation of a particular key, tare values are entered in amounts equal to the value of a scale division. For example, on a 25 pound x 0.01 pound scale, each time a specifically marked key is depressed; a tare is entered equal to 0.01 pound. If that key were depressed five times, the tare value would be equal to 0.05 pound.
- **Programmable Tare:** Preset (predetermined) tare values that are stored in memory for multiple transactions. They may be part of the product information on PLU (product look-up), preset product, or tare keys.
- **Stored Tare:** Preset (predetermined) tare values that are stored in memory for multiple transactions and are used predominately in vehicle scale applications.
- **Percentage Tare:** A preset tare 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.

- **Proportional Tare:** A preset tare 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 and 4 kg, etc.). A proportional tare is, therefore, not limited to being a percentage tare.

The Tare Work Group Recommends the changes to Scales Code

S.2. Design of Balance, Tare, Level, Damping, and Arresting Mechanisms.

S.2.3. ~~Tare~~ Value of Tare Indication and Recorded Representations:

~~On any scale (except a monorail scale equipped with digital indications), the value of the tare division shall be equal to the value of the scale division.*~~ The tare mechanism shall operate only in a backward direction (that is, in a direction of underregistration) with respect to the zero-load balance condition of the scale. A device designed to automatically clear any tare value shall also be designed to prevent the automatic clearing of tare until a complete transaction has been indicated.*
(Amended 1985)

[*Note: - On a computing scale, this requires the input of a unit price, the display of the unit price, and a computed positive total price at a readable equilibrium. Other devices require a complete weighing operation, including tare, net, and gross weight determination*]*
[*Nonretroactive as of January 1, 1983]

S.2.3.1 Scale Interval. – The interval of a tare weighing mechanism shall be equal to the scale interval of the weighing device for any given load.

(a) On any scale (except a monorail scale equipped with digital indications **and multi-interval scales or multiple range scales when the value of tare is determined in a lower range**), the value of the tare division shall be equal to the value of the scale division.*
[*Nonretroactive as of January 1, 1983]

(b) **S.2.3.1- Monorail Scales Equipped with Digital Indications.** - On a static monorail weighing system equipped with digital indications, means shall be provided for setting any tare value of less than 5 % of the scale capacity to within 0.02 % of scale capacity. On a dynamic monorail weighing system, means shall be provided to automatically maintain this condition.
(Amended 1999)

(Renumbered 200X)

S.2.3.2. Accuracy. – A tare weighing or balancing mechanism shall permit setting the indication to zero with an accuracy equal to or better than:

± 0.25 d for electronic weighing devices and any weighing device with an analog indication,

± 0.5 d for mechanical weighing devices with a digital indication (e.g., weighbeams with only notched poises and no sliding poises).

On a multi-interval scale, d shall be replaced by d₁ (division value of the first weighing segment).

S.2.3.3. Operating Range. - The tare mechanism shall be such that it cannot be used at or below its zero effect or above its maximum indicated effect.

On a single or multiple range scale, the maximum tare capacity can not exceed that maximum capacity of the highest weighing range.

On a multi-interval scale, the maximum tare capacity can not exceed that maximum capacity of the first weighing segment.

S.2.3.4. Visibility of Operation. - Operation of the tare mechanism shall be visibly indicated on the instrument. In the case of instruments with digital indication, this shall be done by marking the indicated net value with the word "NET" or the symbol "N."

Note: NET may be displayed as "NET", "Net" or "net".

Note: If a scale is equipped with an indicator that allows the gross value to be displayed temporarily while a tare mechanism is in operation, the "NET" symbol shall disappear while the gross value is displayed.

S.2.3.5. Subtractive Tare Mechanism. – After any tare operation and while tare is in effect, an indicating or recording element shall not display nor record any values when the gross load (not counting the initial dead load that has been canceled by an initial zero-setting mechanism) is in excess of 105 % of scale capacity after tare has been taken.

(Tare WG Note: Add to paragraph S.1.7. (a) Capacity Indication "Flashing weight values are not acceptable as and overload indication.")

S.2.3.6. Semi-automatic or Automatic Tare* Balancing or Weighing Mechanisms. - These mechanisms shall be operable or accessible only by a tool outside of and separate from this mechanism or it shall be enclosed in a cabinet, or it shall be operable only when the indication is stable within:

- (a) ± 3 scale divisions for scales of more than 2000 kg (5000 lb) capacity in service prior to January 1, 1981, and for all axle load, railway track, and vehicle scales; or
- (b) ± 1 scale division for all other scales.

* Automatic Tare Mechanisms are not permitted for direct sales to the public.

S.2.3.7. Combined Zero-setting and Tare-balancing Mechanisms (0/T Key). – *(Tare WG recommends deleting S.2.1.6. Combined Zero-setting and Tare-balancing Mechanisms (0/T Key) in order to keep all tare requirements together).* Scales not intended to be used in direct sales to the public may be equipped with a combined zero and tare function key, provided that the device is clearly marked as to how the key functions. If the semi-automatic zero-setting mechanism and the semi-automatic tare-balancing mechanism are operated by the same key, the following apply at any load:

- 1) After zero/tare setting the effect of accuracy of the zero setting shall be not more than ± 0.25 d.
- 2) A "center-of-zero" condition shall either automatically be maintain to ± 0.25 scale division or less, or have an auxiliary or supplemental "center-of-zero" indicator that defines a zero-balance condition to ± 0.25 of a scale division or less.
- 3) A zero-tracking mechanism, if equipped, shall operate only when:
 - the indication is at zero, or at a negative net value equivalent to gross zero, and
 - the weight indication is stable.
- 4) The scale must also be clearly marked on or adjacent to the weight display with the statement "Not for Direct Sales."

S.2.3.8. Consecutive Tare Operations. - Repeated operation of a tare mechanism (including preset tare) is permitted. If more than one tare mechanism is operative at the same time, tare weight values shall be

clearly designated when indicated or printed.

S.2.3.9. Indication and Printing of Weighing Results.

- a). Gross weight values may be printed without any designation or by complete word or symbol. For a designation by a symbol, only "G" is permitted.
- b). If only net weight values are printed without corresponding gross or tare values, they may be printed without any designation or by a complete word or symbol. The complete word or symbol "N" shall be used to designate a net weight. This applies also where semi-automatic zero-setting and semi-automatic tare balancing are initiated by the same key.
- c). Gross, net, or tare values determined by a multiple range instrument or by a multi-interval instrument need not be marked by a special designation referring to the (partial) weighing range.
- d). If net weight values are printed together with the corresponding gross and/or tare values, the net and tare values shall at least be identified by the corresponding symbols "N" and "T" or by complete words.
- e). If net weight values and tare values determined by different tare mechanisms are printed separately, they shall be suitably identified.

f). When gross, net, and tare values are printed together, one of these values may be calculated from two actual determinations of mass. In the case of a multi-interval device the calculated weight gross or tare value may be printed with a smaller scale interval.

g). The printout of a calculated gross or tare weight value shall be clearly identified. This should be done by the symbol "C" in addition to the symbols mentioned above, if applicable, or by complete words.

Tare WG Comment: These requirements are from the revised version of R 76 and is beyond what is currently required by HB 44 and NTEP.

S.2.4. Preset Tare Mechanism.

S.2.4.1. Modes of Operation. - A preset tare mechanism may be operated together with one or more tare devices provided that:

- the preset tare mechanism complies with paragraph **S.2.3.8. Consecutive Tare Operations.**, and
- a preset tare operation cannot be modified or cancelled as long as any tare mechanism operated after the preset tare operation is still in use.
- a preset tare associated with a price look-up (PLU) shall be automatically cancelled at the same time a PLU is cancelled.

Preset tare may operate automatically only if the preset tare value is clearly identified with the load to be measured (e.g., part of the product look-up information).

S.2.4.2 Indication of Operation. - Operation of the preset tare device shall be visibly indicated on the instrument. In the case of instruments with digital indication, this shall be done by marking the indicated net value with the sign "NET", "Net" or "net." If an instrument is equipped with a device that allows the gross value to be displayed temporarily while a tare device is in operation, the "NET" symbol shall disappear while the gross value is displayed. It shall be possible to temporarily indicate the preset tare value.

Paragraph S.2.3.9. Indication and Printing of Weighing Results. applies accordingly provided that the calculated net value is printed and at least the preset tare value is printed, with the exception of:

1. a class II, or a class III instrument with a maximum capacity not greater than 100 kg used in direct sales to the public, or
2. including price computing scales, or
3. nonautomatic weigh/price labeling scales.

- preset tare values are designated by the symbol "PT"; however, it is permitted to replace the symbol "PT" with complete words. *(TARE WG Comment – This requirements is from the revised version of R 76 and is beyond what is currently required by HB 44 and NTEP. The Tare WG added the class and capacity exception since they felt that the need for providing the additional type of tare information is greater for larger capacity scales and for vehicle scale applications where preset tares are not allowed by some jurisdictions.)*

Note: Paragraph 2.4.2. also applies to weighing devices with a combined semi-automatic zero-setting device and a semi-automatic tare-balancing device operated by the same key.

321 BELT-CONVEYOR SCALE SYSTEMS

321-1 UR.2.2.(n) Belt Alignment

Source: Southern Weights and Measures Association (SWMA)

Recommendation: Modify paragraph UR.2.2.(n) as follows:

UR.2.2. Conveyor Installation

(n) Belt Alignment. – The belt shall be centered on the idlers in the weighing area and shall track in practically the same position whether empty or loaded. The belt shall not extend beyond the edge of the idler roller in any area of the conveyor.

(Amended 1998 **and 2007**)

Background/Discussion: During the 2006 NCWM Interim Meeting, the Committee considered the recommendation from the NCWM review panel's recommendations and comments from industry. The review panel indicated the proposal should have included national data that demonstrated a need for modifying paragraph UR.2.2. and should be a developing item until such data is provided. At that time, one representative from the belt-conveyor scale service industry indicated there are too many factors that influence belt tracking to ensure a belt is centered at all times. The service representative recommended that the belt should not extend beyond the edge of the idler roller in any area of the conveyor on the carrying side or touch holding brackets on the return side to reduce any detrimental affects on accuracy. Industry representatives indicated the design of idlers and scales are such that the belt is not intended to stay in the exact center. Industry also indicated there is no mechanism available to monitor the belt's tracking 24 hours a day, seven days a week. Industry requested specifications for what constitutes either "center" or an acceptable "range of center" for belt tracking. Although the 2005 SWMA reported the proposal was ready for national consideration, the Committee agreed it was more appropriate to make the proposal a developing item until there is some clear indication that belt alignment can be tracked for maintenance and accuracy purposes.

At its 2006 meeting, the WWMA agreed with concerns about the difficulties in tracking belt alignment and agreed it should first be determined if there are mechanisms capable of monitoring this feature before establishing device requirements. Consequently, the WWMA recommended this item be withdrawn from the agenda.

The CWMA does not believe this proposal should move forward without more information from industry.

In 2006, the SWMA recommended the proposal remain a developing item; however, if industry provides no additional input, the item should be withdrawn from the Committee's agenda.

During the 2007 Interim Meeting, the Committee heard that the BCS Code requirements are far too prescriptive when compared to the language in other scale code sections and device operators, manufacturers, and officials are able to detect improper belt alignment either through belt wear or in the system's performance. The Committee agreed the proposed language was sufficiently developed and should be upgraded from a developing item to an Information Item in this report in order to receive additional input and national data demonstrating the need for amending paragraph UR.2.2. The Committee requested input from all stakeholders, to include a review by the National Weighing and Sampling Association by the 2007 Annual Meeting, before it will consider the proposal ready for adoption.

During the 2007 NCWM Annual Meeting, the Committee heard testimony that a work group of the National Weighing and Sampling Association is working on this item and will have a recommendation for the Committee prior to the 2008 NCWM Interim Meeting.

In a letter dated July 31, 2007, the NW&SA Work Group stated that there is insufficient evidence of the effect of small lateral movement of the belt to establish a valid requirement narrower than the edge of the idler roller on belt-conveyor scale systems other than the short conveyors that were used by the original submitter. The Work Group adds that there are no practical devices to measure such lateral alignment changes and recommended that the added language in the original proposal above be withdrawn.

However, the Work Group did make the following recommendation to UR.2.2. (n) to include language that would clarify that the belt shall not come into contact with any part of the conveyor structure.

UR.2.2. (n) Belt Alignment. The belt shall not extend beyond the edge of ~~the idler~~ any carry side (top) roller in any area of the conveyor. **The belt shall not touch the conveyor structure on the return (bottom) side of the conveyor.**

324 AUTOMATIC WEIGHING SYSTEMS

324-1 S.1.2. Value of Division Units and T.2.1. General

Source: National Type Evaluation Technical Committee (NTETC) Weighing Sector

Recommendation: Add a new note to paragraph S.1.2. and amend paragraph T.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 multiple or submultiple of 1, 2, or 5.

Note: The requirements that the value of the scale division be expressed only as 1, 2, or 5, or a decimal multiple or submultiples of only 1, 2, or 5 does not apply to net weight indications and recorded representations that are calculated from gross and tare weight indications where the scale division of the gross weight is different from the scale division of the tare weight(s) on multi-interval or multiple range scales.

For example, a scale indicating a tare weight of 2 kg in the lower range or segment and a gross weight of 5 kg in the higher range or segment may indicate a net weight of 3 kg, or a scale indicating a tare weight of 20 lb in the lower range or segment and a gross weight of 50 lb in the higher range or segment may indicate a net weight of 30 lb.

(Note Added 200X)

S.2.2. Tare. – On any automatic weighing system (except for multi-interval scales or multiple range scales when the value of tare is determined in a lower range) the value of the tare division shall be equal to the value of the scale division. The tare mechanism shall operate only in a backward direction (i.e., in a direction of underregistration) with respect to the zero-load balance condition of the automatic weighing system. A device designed to automatically clear any tare value shall also be designed to prevent the automatic clearing of tare until a complete transaction has been indicated.

Note: On a computing automatic weighing system, this requires the input of a unit price, the display of the unit price, and a computed positive total price at a readable equilibrium. Other devices require that a transaction or lot run be completed.

(Amended 2004 and 200X)

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

(Amended 200X)

Discussion: In 2006, the NTETC Weighing Sector formed a Tare WG to review existing tare requirements, and make recommendations about how tare is to operate on a single range scale, multiple range scale, and multi-interval scale. The WG was also asked to develop, where necessary, recommendations for changes to Publication 14, HB 44, and HB 130, and to provide guidance to the Weighing Sector on type evaluation requirements.

This proposal developed by the Tare WG and supported by the Weighing Sector, adds a new note to paragraph S.1.2. The note recognizes display and printing of net weight values in divisions other than the scale division used in the display of gross weight, resulting in a more accurate net weight determination.

The proposal also amends paragraph T.2.1. to clarify that tolerances also apply to net weight indications regardless of the gross load on the scale. To determine if there were areas where HB 44 could be aligned with international recommendations, the Tare WG reviewed OIML R 76 "Nonautomatic Weighing Instruments" for corresponding requirements. Based on that review, the WG agreed that HB 44 paragraph T.2.1. should be modified to state that tolerances also apply to net load indications.

The Tare WG discussed problems associated with determining the appropriate direction to round tare on multi-interval scales and multiple range scales whenever gross and tare weights fall in different weighing segments on a multi-interval scale or in different weighing ranges on multiple range scales. In these cases, the scale division size for the gross and tare weights differ; however, the net weight must be in mathematical agreement with the gross and tare weights that are indicated and recorded by the device (i.e., gross weight - tare weight = net weight).

The problem arises when the tare weight is rounded up to the next larger scale division, where the net weight falls in the higher segment or range. For example, a 0.004 lb tare weight 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:

$$\begin{array}{r} 10.05 \text{ lb Gross Weight} \\ - 0.004 \text{ lb Tare Weight} \\ \hline = 10.046 \text{ lb the Mathematically Correct Net Weight;} \end{array}$$

However, because the tare weight will be rounded to zero in the upper range, the device indicates 10.05 lb Net Weight.

This results in a transaction where a commodity is bought or sold on the basis of gross weight(as shown in the example above) or when an insufficient amount of tare weight is taken and results in a misrepresentation of net

weight for the transaction. Essentially, the rounding of tare that falls in a smaller division in either direction provides a less accurate net weight than if the tare weight were not rounded.

The Tare WG developed a corresponding proposal for the Scales Code to clarify the appropriate scale division values and the application of tolerances to tare weights for those devices (see S&T Item 320-3).

The SWMA supports the recommendation; however, the SWMA also agreed that an additional note should be added to paragraph S.2.2. Tare (as shown in the recommendation above) to eliminate any conflict with proposed changes to paragraph S.1.2. The new note proposed for paragraph S.2.2. clarifies that the requirement does not apply to multi-interval scales or multiple range scales when tare is determined in the lower range of those scales.

The WMD agreed that it might be more appropriate if the proposed new note explains that gross weight and calculated tare weight are expressed as an "indicated weight value" rather than as a "scale value." The WMD notes that the proposed SWMA text is necessary to clarify that tare weights are excluded from the requirement that specifies tare weight values must be the same as the scale division value. However, the SWMA's proposal needs further work to clarify that if only part of the entire paragraph applies to tare weights indicated on either a multi-interval or multiple range scale and to clarify the relationship of paragraph S.1.2. to corresponding paragraph S.2.2. The WMD also asked if it was the SWMA's intent that this newly proposed note be a retroactive or nonretroactive requirement, and if nonretroactive, then what is an appropriate effective date?

The SMA supports the Weighing Sector proposal, but recommends the proposed new note become a subparagraph of paragraph S.1.2. and a modification to the proposed new text in paragraph T.2.1. to require the net weight indication for "any" rather than "every" possible tare load using certified test loads. The Committee agreed to the SMA's recommended changes to paragraph T.2.1. and modified the proposal accordingly.

The Committee deliberated at length on this item and S&T Items 320-5, 320-9, and 324-3, which are all meant to clarify the distinct differences in how various tare features are permitted to operate. The Committee agreed that ultimately neither the buyer nor seller should incur a loss as a result of inaccurate calculation of a tare weight. Much of the weights and measures community has not had the opportunity to discuss these proposals nor has the Tare WG or Weighing Sector had time to analyze feedback on these proposed changes and to a corresponding proposal to 320-3 and 324-3 to make changes to the Scales Code and the AWS Code, respectively. The Committee agreed that all proposals related to the operation of the tare feature should be Information Items to ensure that all aspects of the operation of tare features are clearly defined for the public and private sectors and its operation is adequately addressed.

During the 2007 NCWM Annual meeting, the Committee heard comments from the CWMA and NEWMA supporting this item with recommendations to change the word "value" to "division" and incorporating the SWMA recommendation to modify paragraph S.2.2.

NEWMA pointed out that proposed the change to paragraph S.2.1. appears to be permissive and not a requirement and asked if the intent is to prohibit multi-interval and multiple range scales from rounding and indicating calculated net weights in scales divisions to only 1, 2, or 5 when appropriate or allow the rounding the scale divisions of 1, 2, or 5 still allowed? The WMD representative to the NCWM Tare Work Group stated that the intent is for the language to be permissive because there are a significant number of devices with NTEP CCs in the marketplace that round the tare values before calculating net weights.

The Committee made several modifications to the proposal to clarify the:

- examples in the proposed note to paragraph S.1.2., and
- SWMA proposed modification to the language in S.2.2. for an exception for multi-interval and multiple range scales only applies to the requirement that the value of tare shall be equal the value of the scale division.

The Committee also agreed that the words "scale value" should be changed to "scale division" to be consistent with the terminology currently used in HB 44 and recommends that NIST Technical Advisor forward the amended proposal to the Tare Work Group and NTETC Weighing Sector for their consideration and comment.

324-2 Appendix D; Definitions for Tare Mechanism, Gross Weight Value, Net Weight, Net Weight Value, Tare, and Tare Weight Value

Source: S&T Committee

Recommendation: Modify the definition for “tare mechanism” and add new definitions for “gross weight value,” “net weight,” “net weight value,” “tare,” and “tare weight value” to Appendix D that apply to Section 2.24 Automatic Weighing Systems as shown in the “Recommendation” for Scales Code Item 320-9.

Discussion: At the 2007 Interim Meeting, the Committee agreed that for procedural reasons a separate corresponding proposal should have appeared on its 2007 S&T Agenda in Section 324 for Automatic Weighing Systems. Therefore, the Committee developed a separate proposal for automatic weighing systems that now appears in this agenda. The Committee recommends that new S&T Item 324-2 along with a corresponding proposal to apply these definitions to devices that fall under the Scales Code S&T Item 320-3, be discussed and considered jointly during all deliberations. In the interest of brevity, the Committee placed all recommendations, discussion, and background information for this proposal in S&T Item 320-3 because the proposed definitions apply to both applications; this ensures both proposals are addressed collectively.

330 LIQUID-MEASURING DEVICES

330-1 Temperature Compensation for Liquid Measuring Devices Code

Source: 2007 S&T Committee

Discussion/ Background: The Committee is considering a proposal to make the following modifications to Section 3.30. Liquid-Measuring Devices (LMD) Code to recognize temperature compensation for retail devices as follows:

S.1.6.8. Recorded Representations from Devices with Temperature Compensation. – Receipts issued from devices or systems with automatic temperature compensation must include a statement that the volume of the product has been adjusted to the volume in liters at 15 °C for liters or the volume in gallons at 60 °F for gallons.

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

S.1.6.89. Lubricant Devices, Travel of Indicator. – The indicator shall move at least 2.5 cm (1 in) in relation to the graduations, if provided, for a delivery of 0.5 L (1 pt).

S.2.6. Temperature Determination ~~and Wholesale Devices.~~ – For test purposes, means shall be provided to determine the temperature of the liquid either:

(a) in the liquid chamber of the meter, or

(b) immediately adjacent to the meter in the meter inlet or discharge line.

[Nonretroactive as of January 1, 1985]

(Added 1984) (Amended 1986 **and 200X**)

S.2.7. Wholesale Devices Equipped with Automatic Temperature Compensators.

S.2.7.1. Automatic Temperature Compensation. – A device may be equipped with an **adjustable** automatic means for adjusting the indication and registration of the measured volume of product to the volume at 15 °C **for liters or (60 °F) for gallons.**

S.2.7.2. Display of Net and Gross Quantity. – **A device equipped with automatic temperature compensation shall indicate or record, both the gross (uncompensated) and net (compensated) volume for testing purposes. It is not necessary that both net and gross volume be displayed simultaneously.**

[Nonretroactive as of January 1, 200X]

S.2.7.23. Provision for Deactivating. – On a device or system equipped with an automatic temperature-compensating mechanism that will indicate or record only in terms of liters compensated to 15 °C or gallons compensated to (60 °F), provision shall be made for deactivating the automatic temperature-compensating mechanism so that the meter can indicate, ~~and record if it is equipped to~~ record, in terms of the uncompensated volume.

(Amended 1972 and 200X)

S.2.7.34. Provision for Sealing Automatic Temperature-Compensating Systems. – Provision shall be made for applying security seals in such a manner that an automatic temperature-compensating system cannot be disconnected and that no adjustment may be made to the system without breaking the seal or providing a record of the action.

S.2.7.4.5. Temperature Determination with Automatic Temperature-Compensation. – For test purposes, means shall be provided (e.g., thermometer well) to determine the temperature of the liquid either:

S.4.3. Wholesale Devices.

~~S.4.3.1. Discharge Rates.~~ – A wholesale device shall be marked to show its designed maximum and minimum discharge rates. However, the minimum discharge rate shall not exceed 20 % of the maximum discharge rate.

~~S.4.3.2. Temperature Compensation.~~ – If a device or system is equipped with automatic temperature compensation, the primary indicating elements, recording elements, or recorded representation shall be clearly and conspicuously marked to show that the volume delivered has been adjusted to the volume at 15 °C for liters or (60 °F) for gallons.
(Amended 200X)

S.4.34. Wholesale Devices, Discharge Rates. – A wholesale device shall be marked to show its designed maximum and minimum discharge rates. However, the minimum discharge rate shall not exceed 20 % of the maximum discharge rate.

Renumber successive paragraphs S.4.4. to S.4.5.

~~N.4.1.1. Wholesale Devices Equipped with Automatic Temperature-Compensating Systems.~~ – On ~~wholesale~~ devices equipped with automatic temperature-compensating-systems, normal tests shall be conducted:

- (a) by comparing the net (compensated) volume indicated or recorded to the actual delivered volume ~~corrected~~ adjusted to 15 °C for liters or 60 °F for gallons, and
- (b) ~~with the temperature-compensating system deactivated,~~ comparing the gross (uncompensated) volume indicated or recorded to the actual delivered volume. (For some devices this may require that the temperature compensator be deactivated.)

The first test shall be performed with the automatic temperature-compensating system operating in the "as found" condition. On devices that indicate or record both the compensated and uncompensated volume for each delivery, the tests in (a) and (b) may be performed as a single test.

(Amended 1987 and 200X)

N.5. Change in Product Temperature Correction on Wholesale Devices. – Corrections Adjustments shall be made for any changes in volume resulting from the differences in liquid temperatures between time of passage through the meter and time of volumetric determination in the prover or test measure. When adjustments are necessary, appropriate petroleum measurement tables should be used.

(Amended 1974 **and 200X**)

UR.3.6. Temperature Compensation.

UR.3.6.1. Automatic.

UR.3.6.1.1. ~~When to be~~ Used of Automatic Temperature Compensation. – If a device is equipped with ~~a mechanical~~ automatic temperature ~~compensator~~ **compensation**, it shall be connected, operable, and in use at all times. An electronic or mechanical automatic temperature-compensating system may not be removed, nor may a compensated device be replaced with an uncompensated device, without the written approval of the ~~responsible~~ weights and measures jurisdiction **with statutory authority over the device.**

[**Note:** This requirement does not specify the method of sale for product measured through a meter.]
(Amended 1989)

UR.3.6.1.2. Recorded Representations (Invoices, Receipts, and Bills of Lading.)

(a) **An ~~written~~ invoice based on a reading of a device ~~or recorded representation issued by a device or system~~ that is equipped with an automatic temperature compensator shall show that the volume delivered has been adjusted to the volume at 15 °C ~~for liters or (60 °F) for gallons and decimal subdivisions or fractional equivalents thereof.~~**

(b) The invoice issued from an electronic wholesale device equipped with an automatic temperature-compensating system shall also indicate: (1) the API gravity, specific gravity or coefficient of expansion for the product; (2) product temperature; and (3) gross reading.

(c) On request, the owner or operator of a retail device equipped with an active automatic temperature compensator shall provide the official with statutory authority the bills of lading for at least the last two deliveries.

(Amended 1987 and 200X)

UR.3.6.1.3. Temperature Determination. – Means for determining the temperature of measured liquid in an automatic temperature-compensating system shall be so designed and located that, in any “usual and customary” use of the system, the resulting indications and/or recorded representations are within applicable tolerances.
(Added 200X)

UR.3.6.4. Temperature Compensated Sale. – All sales of products, when the quantity is determined by an approved measuring system with temperature compensation, shall be in terms of the liter at 15 °C or the U.S. gallon of 231 in³ at 60 °F.
(Added 200X)

Prior to the 2007 NCWM Interim Meeting, the Committee recognized via reports from the regional L&R committees and other sources that there was increasing support within the weights and measures community to address temperature compensation features for the retail sale of petroleum products in the Liquid-Measuring Devices Code. In response to these concerns and to encourage uniformity in applications where temperature compensation is being used, the Committee developed this proposal to provide design and performance requirements and testing criteria for retail metering systems that incorporate temperature compensation capability. The Committee was also concerned that if the current L&R Committee proposed language for the Method of Sale of Commodities in NIST HB 130 is adopted, retail motor-fuel devices could be placed in service with no guidelines in HB 44 for type approval and field testing. The L&R proposed language would permit the temperature-compensated sale of petroleum products at all levels of distribution.

At the 2007 Interim Meeting, the L&R Committee moved forward with a Method of Sale proposal containing permissive language for retail sales of petroleum products using automatic temperature compensation (see L&R Item 232-1). Although the Committee recognized that this S&T item was still not fully developed, it felt it could

resolve the remaining issues in time for the NCWM Annual Meeting in July 2007; therefore, the Committee unanimously voted to make this item a “priority” voting item as described in Section H of the Introduction of HB 44. It did this because it felt strongly that if the L&R item passed it was very important for there to be a corresponding S&T item that provided HB 44 guidance as described above. Following the Committee vote the Committee chairman went before the NCWM Board of Directors (BOD) for their input. The BOD instructed the Committee to make this an information item. Irrespective of the concerns about the timing of adoption of language in HB 130, the Committee, after further deliberation, concurred with the BOD and added the proposal to its agenda as an information item. The BOD further informed the Committee of its plan to form a steering committee to provide guidance and give support to both the S&T and L&R Committees on temperature compensation issues. The Committee looks forward to working with the steering committee on this important issue.

This item is still in development. Some of the issues the Committee is currently working on are outlined below.

Recorded Representations (S.1.6.7.): What, if any, abbreviations are acceptable for devices equipped with ATC (e.g., gal at 60 °F)?

API Gravity: How should the API gravity be entered in the device and what API gravity should the inspector use during a test? Should an average API gravity be used (National or State)? The Committee will work on gathering API data in order to resolve this issue.

Difference between Net and Gross (T.4.): Is the current tolerance of 0.1 % (electronic) appropriate for field-testing of retail devices with ATC? Will maintaining our current tolerances mean taking extra drafts to obtain a stable temperature? The Committee will work on gathering data concerning temperature measurement.

The Committee will continue work on this issue and will seek input from the regions and other interested parties in the weights and measures community.

360 OTHER ITEMS

360-1 International Organization of Legal Metrology (OIML) Report

Many issues before the OIML, the Asian-Pacific Legal Metrology Forum (APLMF), and other international groups are within the purview of the Committee. Additional information on OIML activities will appear in the Board of Directors Agenda and Interim and Final Reports and on the OIML website at <http://www.oiml.org>. NIST WMD staff will provide the latest updates on OIML activities during the open hearing sessions at NCWM meetings. For more information on specific OIML-related device activities, contact the WMD staff listed in the table below. The OIML projects listed below represent only currently active projects. For additional information on other OIML device activities that involve WMD staff, please contact WMD using the information listed below:

The WWMA and the SWMA support these issues and the related device activities as an information item.

NIST Weights and Measures Division (WMD) Contact List for International Activities	
Contact Information	Responsibilities
Postal Mail and Fax for All Contacts:	NIST WMD 100 Bureau Drive MS 2600 Gaithersburg, MD 20899-2600 Tel: (301) 975-4004 Fax: (301) 975-8091
Mr. Kenneth Butcher (LMG) (301) 975-4859 kenneth.butcher@nist.gov	<ul style="list-style-type: none"> •D 1 "Elements for a Law on Metrology" •TC 3 "Metrological Control" •TC 3/SC 1 "Pattern Approval and Verification" •TC 3/SC 2 "Metrological Supervision" •TC 6 "Prepackaged Products"
Mr. Steven Cook (LMDG) (301) 975-4003 steven.cook@nist.gov	<ul style="list-style-type: none"> •R 50 "Continuous Totalizing Automatic Weighing Instruments (Belt Weighers)" •R 51 "Automatic Catchweighing Instruments" •R 60 "Metrological Regulations for Load Cells" •R 76 "Non-automatic Weighing Instruments"
Dr. Charles Ehrlich (ILMG) (301) 975-4834 charles.ehrlich@nist.gov	<ul style="list-style-type: none"> •CIML Member •B 10 "Framework for a Mutual Acceptance Arrangement (MAA) on OIML Type Evaluations" •TC 3/SC 5 "Expression of Uncertainty in Measurement in Legal Metrology Applications," "Guidelines for the Application of ISO/IEC 17025 to the Assessment of Laboratories Performing Type Evaluation Tests," & "OIML Procedures for Review of Laboratories to Enable Mutual Acceptance of Test Results and OIML Certificates of Conformity"
Mr. Richard Harshman (LMDG) (301) 975-8107 richard.harshman@nist.gov	<ul style="list-style-type: none"> •R 106 "Automatic Rail-weighbridges" •R 107 "Discontinuous Totalizing Automatic Weighing Instruments" (totalizing hopper weighers) •R 134 "Automatic Instruments for Weighing Road Vehicles In-Motion and Measuring Axle Loads"
Ms. Diane Lee McGowan (LMDG) (301) 975-4405 diane.lee@nist.gov	<ul style="list-style-type: none"> •R 59 "Moisture Meters for Cereal Grains and Oilseeds" •R 92 "Wood Moisture Meters-Verification Methods and Equipment" •R 121 "The Scale of Relative Humidity of Air Certified Against Saturated Salt Solution" •TC 17/SC 8 "Measuring Instruments for Protein Determination in Grains"
Mr. Ralph Richter (ILMG) (301) 975-3997 ralph.richter@nist.gov	<ul style="list-style-type: none"> •R 35 "Material Measures of Length for General Use" •R 49 "Water Meters" (Cold Potable Water & Hot Water Meters) •R 71 "Fixed Storage Tanks" •R 80 "Road and Rail Tankers" •R 85 "Automatic Level Gauges for Measuring the Level of Liquid in Fixed Storage Tanks" •R 105 & R 117 "Measuring Systems for Liquids Other Than Water" (all measuring technologies) •R 118 "Testing Procedures and Test Report Format for Pattern Examination of Fuel Dispensers for Motor Vehicles" •TC 3/SC 4 "Verification Period of Utility Meters Using Sampling Inspections" •TC 8/SC 7 P1 "Measuring Systems for Gaseous Fuel" (i.e., large pipelines) •TC 8/SC 7 P2 "Compressed Gaseous Fuels Measuring Systems for Vehicles" •TC 8/SC 8 "Gas Meters" (Diaphragm, Rotary Piston, & Turbine Gas Meters)

NIST Weights and Measures Division (WMD) Contact List for International Activities			
Contact Information		Responsibilities	
Dr. Ambler Thompson (ILMG) (301) 975-2333 ambler@nist.gov		<ul style="list-style-type: none"> •D 16 “Principles of Assurance of Metrological Control” •D 19 “Pattern Evaluation and Pattern Approval” •D 20 “Initial and Subsequent Verification of Measuring Instruments and Processes” •D 27 Initial Verification of Measuring Instruments Using the Manufacturer’s Quality Management System” •R 34 “Accuracy Classes of Measuring Instruments” •R 46 “Active Electrical Energy Meters for Direct Connection of Class 2” •TC 5/SC 2 “General Requirements for Software Controlled Measuring Instruments” 	
Ms. Juana Williams (LMDG) (301) 975-3989 juana.williams@nist.gov		<ul style="list-style-type: none"> •R 21 “Taximeters” 	
LIST OF ACRONYMS			
ILMG – International Legal Metrology Group	LMDG– Legal Metrology Devices Group LMG – Laws and Metrics Group	B – Basic Publication CIML – International Committee of Legal Metrology D – Document	P – Project R – Recommendation SC – Subcommittee TC – Technical Committee

360-2 Developing Items

The NCWM established a category of items called “Developing Items” as a mechanism to share information about emerging issues which have merit and are of national interest, but that have not received sufficient review by all parties affected by the proposal or that may be insufficiently developed to warrant review by the Committee. The developing items are currently under review by at least one regional association, technical committee, or organization.

Developing items are listed in Appendix A according to the specific HB 44 code section under which they fall. Periodically, proposals will be removed from the developing item agenda without further action because the submitter recommends it be withdrawn. Any remaining proposals will be renumbered accordingly.

The Committee encourages interested parties to examine the proposals included in Appendix A and send their comments to the contact listed in each item. The Committee asks that the regional associations and NTETC Sectors continue their work to develop fully each proposal. Should an association or Sector decide to discontinue work on an item, the Committee asks that it be notified.

Carol P. Fulmer, South Carolina, Chairman (1)
Todd R. Lucas, Ohio (2)
Brett Saum, San Luis Obispo County, California (3)
Kristin Macey, Colorado (4)
Rick Fogal, PA (5)

Ted Kingsbury, Measurement Canada, Technical Advisor
Steven Cook, NIST, Technical Advisor
Richard Suiter, NIST, Technical Advisor

Specifications and Tolerances Committee

Appendix A

Item 360-2: Developing Items

Part 1, Item 1 Scales: S.1.4.6. Height and Definition of Minimum Reading Distance, UR.2.10. Primary Indicating Elements Provided by the User, UR.2.11. Minimum Reading Distance and Definitions of Minimum Reading Distance and Primary Indications

Source: NTETC Weighing Sector

Note: This proposal was Carryover Item 320-2 in the Committee's 2006 Agenda and appeared on the Committee's 2007 Agenda as Item 320-4. (This item originated from the 2005 National Type Evaluation Technical Committee (NTETC) Weighing Sector and first appeared on the Committee's 2006 agenda.) The Committee believes that although the proposal has merit there does not appear to be a consensus on the size and quality of primary indication information on devices used in direct and indirect sales transactions or an enforcement date for such requirements. Therefore, the Committee moved Item 320-4 from its agenda and made it a Developing Item 360-2 Part 1, Item 1 to allow sufficient time for the community to fully develop requirements acceptable to those affected.

Recommendation: The Committee considered the Weighing Sector's first attempt at a proposal that adds new paragraphs S.1.4.6., UR.2.10., and UR.2.11. to the Scales Code.

S.1.4. Indicators.

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 2 mm (0.08 in) high.

[Nonretroactive as of January 1, 200X]

(Added 200X)

UR.2. Installation Requirements

UR.2.10. Primary Indicating Elements Provided by the User. – Primary indicating elements that are not the same as the primary indicating elements provided by the original equipment manufacturer (e.g., video display monitors) shall comply with the following:

- (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 information, such as gross, tare, net, etc., shall be displayed or marked on the device and shall be at least 2 mm (0.08 in) high.

(Added 200X)

UR.2.11. Minimum Reading Distance – On digital devices that display primary indications, the height of the numbers expressed in millimeters should be not less than three times the minimum reading distance expressed in meters, without being less than 2 mm (0.08 in). (Example: If the height of the primary indications is 10 mm, then the minimum reading distance should not be greater than 30 m).

(Added 200X)

Add new definitions of “minimum reading distance” and “primary indications” to Appendix D as follows:

minimum reading distance. The shortest distance that an observer is freely able to approach the indicating device to take a reading under normal conditions of use. This approach is considered to be free for the observer if there is a clear space of at least 0.8 m in front of the indicating device. However, if the minimum reading distance “S” in Figure X below is less than 0.8 m, then the minimum reading distance is “L” in Figure X. [2.20] (Added 200X)

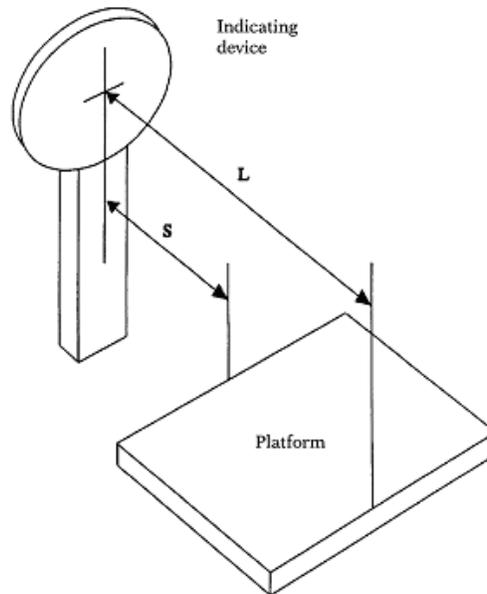


Figure X

primary indications. Weight or other units of measurement values that are displayed by a primary indicating element. The primary indications are used as the determining factor in arriving at the sale representation when the device is used commercially. (Examples of primary indications include the measurement value, unit price or count, and total price on instruments capable of price computing. Primary indications do not include indications from auxiliary indicating devices such as totalizing registers and pre-determined stop mechanisms.) [1.10], [2.20] (Added 200X)

This proposal was developed to address a growing problem with the readability of weight indications and the values that define transaction information. Field and laboratory officials indicate 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.



Field and laboratory officials need more specific requirements to consistently determine if indications are suitable for the environment in which the device is used. Currently only the Taximeters, Grain Moisture Meters, and Near-Infrared Grain Analyzers Codes include requirements that specify the minimum height of figures, words, and symbols. The size requirements for all three-device technologies were developed primarily because of concerns about the visibility of indications from the customer's position. HB 44 and NCWM Publication 14 include no uniform size requirements or specific guidelines on how to evaluate display information for clarity and readability for equipment other than these three device types.

The Committee agreed that although the clarity and readability of indications is a growing issue, the current proposal has only limited support from the public and private sectors. The Committee recognized the proposal requires a significant amount of work before the language is clear, technically correct, and deemed applicable to the different types of installations and technologies in current use. The Committee has concerns about whether or not the proposed 2 mm height requirements for units of measurement and other markings are adequate. The Committee also questioned the clarity of the proposed user requirements for the minimum reading distance.

The Committee recommends the submitter consider several points in its review of the current proposal:

- The proposed 2 mm height limits in the proposal may possibly be an error due to a miscommunication within the Weighing Sector. The value was intended to be closer to that of the figure in the example display which was 4 mm.
- Any specification and corresponding user requirement should provide laboratory and field officials with uniform guidelines:
 - to determine if the required markings on a new equipment design from the manufacturer or a device recently modified by the owner or a service company are suitable for continued use in a particular application; and
 - to remove all ambiguity or subjectivity when assessing if primary indications can be observed from a reasonable customer and operator position
- A size requirement for figures and their corresponding descriptive symbols and characters that are specified as a percentage might be a good approach. This approach was explored by the 2006 Weighing Sector in its review of the relationship of size requirements for taximeter indications. The legibility of primary indications is dependent upon or relative to not only the distance the reader is from the information, but also the total area (square footage) of the display panel where those markings are posted. For example, a 9.5 mm figure is not a suitable size for a primary indication on a typical vehicle scale scoreboard because of the distance of the scoreboard from the typical customer position.
- Corresponding new language in HB 44 that is similar to that which exists in HB 130 for labels might be needed. This language may be necessary to provide guidelines to ensure there is sufficient contrast between

the color and illumination of all required markings and their background. For example, a requirement might specify, "all required markings shall be prominent, definite, plain, and conspicuous as to size and style of symbols, letters, and numbers and as to color that is in contrast to the background and presented so that there is adequate free area surrounding those markings." This language would be consistent with current General Code requirements or might be added to a specific code section of HB 44.

- A recognized vision standard such as those used to determine visual acuity (eye exam charts, etc.) might be a good source for establishing specific distance limits.
- When the size of indications becomes a selectable configuration parameter, access to this feature must be sealed.

For more background information refer to the Committee's 2006 Final Report.

During the Annual Meeting, The Committee was informed that the NTETC Weighing Sector will continue to develop this item.

To comment on this proposal, contact Steven Cook, NIST Technical Advisor to the NTETC Weighing Sector, by e-mail at steven.cook@nist.gov, by telephone at (301) 975-4003, by fax at (301) 975-8091, or by postal mail at NIST WMD, 100 Bureau Drive MS 2600, Gaithersburg, MD 20899-2600.

At its 2007 NTEP Participating Laboratory Meeting, the weighing device labs discussed this item and reviewed the equivalent recommendations in OIML R 76. It was noted that the minimum height requirement for the weight display applied to scales used in direct sale applications with a capacity of 100 kg or less. Additionally, it was noted that R 76 was written to apply to weighing devices that indicated primarily in SI units and that U.S. scales are frequently configured with both SI and inch-pound units. The labs agreed that with the suggestion that the proposed language for the minimum height of the weigh display be limited to scales used in direct sales with a capacity of 200 kg or less. The minimum height of the "units" indication would only be applicable to devices with external lb/kg switching capability since there would be no chance of facilitating fraud using the lb/kg switching capability.

The NIST Technical Advisor contacted a manufacturer about the labs recommendation to revise proposed S.1.4.6. The manufacture believed most products could comply; however he could not speak for other manufacturers. He also stated that this did not address questions about the minimum size of an annunciator that points to a unit legend silkscreen on the scale next to the annunciator.

The WMD adds that there has been little discussion on the clarity of the displays and annunciators and perhaps the proposal should include language similar to Handbook 130 Packaging and Labeling Regulation paragraphs:

- 8.1.2. Style of Type or Lettering that states that the "declaration or declarations of quantity shall be in such a style of type or lettering as to be boldly, clearly, and conspicuously presented with respect to other type, lettering, or graphic material on the package, except that . . .," and
- 8.1.3. Color Contrast that states that the "declaration of quantity shall be in a color that contrasts conspicuously with its background . . ."

The NIST Technical Advisor has amended the proposal to address the concerns and suggestions from the manufacturers, NTEP labs, and the WMD. The NIST Technical Advisor did not develop any changes to the proposed definition of "Primary Indications" and to the proposed User Requirements and associated definition for "Minimum Reading Distance." The Sector is asked to review the following proposed language and provide a recommendation that can be forwarded to the regional weights and measures associations.

S.1.4. Indicators.

S.1.4.6. Direct Sale Primary Indications - Size and Character. Scales designed for direct sale applications with a capacity of 100 kg (200 lb) or less shall comply with the following:

- a. All indications or weight shall be indicated clearly and simultaneously.**

- b. All indications and associated descriptive markings (e.g., lb, kg, gross, tare, net, etc.) shall be presented in such a style of type or lettering as to be boldly, clearly, and conspicuously presented with respect to other type, lettering, or graphics.
- c. All indications and associated descriptive markings shall be in a color or shade that contrasts conspicuously with its background.
- d. All primary indications displayed to the customer, including unit price and total price on computing devices, shall be at least 9.5 mm (0.4 in) high.
- e. All units of mass indications, except for devices that can only indicate in a single unit, shall be at least 21 % on the height of the primary weight indications.

[Nonretroactive as of January 1, 200X]

(Added 200X)

primary indications. Weight or other units of measurement values that are displayed by a primary indicating element. The primary indications are used as the determining factor in arriving at the sale representation when the device is used commercially. (Examples of primary indications include the measurement value, unit price or count, and total price on instruments capable of price computing. Primary indications do not include indications from auxiliary indicating devices such as totalizing registers and pre-determined stop mechanisms.) [1.10], [2.20]

(Added 200X)

Part 2, Item 1 Belt-Conveyor Scale Systems: UR.3.2.(c) Maintenance; Zero Load Tests

Source: 2005 Western Weights and Measures Association (WWMA)

Recommendation: Modify UR.3.2.(c) as follows:

UR.3.2. Maintenance. – Belt-conveyor scales and idlers shall be maintained and serviced in accordance with manufacturer's instructions and the following requirements:

- (c) Zero-load and load (simulated or material) tests, ~~Simulated load tests, or material tests, and zero load tests~~ shall be conducted at periodic intervals between official tests in order to provide reasonable assurance that the device is performing correctly.

(Amended 200X)

The action to be taken as a result of the zero-load tests is as follows:

(Added 2000X)

- if the change in zero is less than ± 0.1 %, make no adjustment, record results and proceed to simulated load tests; or
- if the change in zero is ± 0.1 % to ± 0.25 %, inspect the conveyor and weighing area for compliance with UR.2. Installation Requirements and retest.

(Added 200X)

The action to be taken as a result of the simulated load or material tests ~~or simulated load tests~~ is as follows:
~~(Amended 2002)~~

- if the error is less than 0.25 %, no adjustment is to be made;

- if the error is at least 0.25 % but not more than 0.6 %, **inspect the conveyor and weighing area for compliance with UR.2. Installation Requirements and repeat the test** adjustment may be made if the official with statutory authority is notified;
(Amended 1991 **and 200X**)
- **if the result of tests, after compliance with UR.2. Installation Requirements is verified, remain greater than ± 0.25 %, a span correction shall be made and the official with statutory authority notified;**
- if the error is greater than 0.6 % but does not exceed 0.75 %, **inspect the conveyor and weighing area for compliance with UR.2. Installation Requirements, and repeat the test;**
(Amended 1991 **and 200X**)
- **if the result of tests, after UR.2. Installation Requirements compliance is verified, remains greater than ± 0.25 %, a span correction shall be made, the official with statutory authority shall be notified, and an official test shall be conducted;**
- if the error is greater than 0.75 %, an official test is required.
(Amended 1987 **and 200X**)

Discussion: HB 44 gives limited guidance on what to do with zero-load test results. Belt loss is not the only factor which may require the scale operator to make physical adjustments to the belt-conveyor system to correct for deficiencies. For example, a dirty scale structure or a worn belt scraper will increase the zero-reference number and the test results may exceed tolerances.

The scale user/owner has to protect his interest between weighing transactions. At present, some belt-conveyor systems may have errors greater than 0.5 % in zero reference over a 24-hour period. The belt is part of tare (net load) on any empty running system and the system must be maintained to within tolerance at all times.

During its 2006 meeting, the WWMA recommended the alternate industry proposal shown above. The WWMA also recommended the alternate proposal be considered at a future meeting of the USNWG on Belt-Conveyor Scale Systems. The WWMA recommended the alternate proposal remain a developmental item to allow sufficient time for a review by the WG. The CWMA and the SWMA concur with the WWMA's recommendation.

During the 2007 NCWM Annual Meeting, the Committee heard testimony that a work group of the National Weighing and Sampling Association is working on this item and will have a recommendation for the WWMA prior to their 2007 Annual Technical Conference.

Participants in the work group include:

Phil Carpentier, PTC Consulting, LLC	(ptcarpentier@att.net)
Paul Chase, Chase Technology, Inc	(mjc@emily.net)
Al Page, Montana Weight and Measures	(awp88bb@gmail.com)
Peter SIRRICO, Thayer Scale	(psirrico@thayerscale.com)
Bill Ripka, Thermo Ramsey	(bill.ripka@thermofisher.com)

This work group agrees that there is a need to establish some zero-load test interval for the normal use of a belt-conveyor scale system and that there is also a need to vary that interval (longer interval if the scale is stable, shorter if the zero-load tests require frequent adjustment). The work group has reviewed and discussed this developing item and has submitted the following **DRAFT** revised proposal to the NIST Technical Advisor to the S&T Committee.

UR.3.2. Maintenance. – Belt-conveyor scales and idlers shall be maintained and serviced in accordance with manufacturer's instructions and the following requirements:

- (d) **Simulated load tests or material tests and zero-load tests** ~~Simulated load tests, or material tests, and zero-load tests~~ shall be conducted at periodic intervals between official tests in order to provide reasonable assurance that the device is performing correctly. **The minimum test interval shall be established by the official with statutory authority.**
(Amended 200X)

The action to be taken as a result of the zero-load tests is as follows:
(Added 2000X)

- **If the zero error is less than 0.25%, adjustment to zero.**
- **If the zero error is at least 0.25 % but not more than 0.5%, inspect the belt-conveyor scale system for installation and maintenance items (e.g., clearance, material adhering to the belt, alignment, etc.), make required corrections, adjust the zero, and repeat the zero-load test.**
- **If the zero error is greater than 0.5%, inspect the belt-conveyor scale system, make required corrections installation and maintenance items (e.g., clearance, material adhering to the belt, alignment, etc.), adjust the zero, and reduce the interval between zero tests.**
(Added 200X)

The action to be taken as a result of the material tests or simulated load tests is as follows:
(Amended 2002)

- If the error is less than 0.25 %, no adjustment is to be made.
- If the error is at least 0.25 % but not more than **0.56 %**, **the span shall be adjusted by an authorized service agent and** ~~adjustment may be made~~ if the official with statutory authority is notified;
(Amended 1991 and 200X)
- If the error is greater than **0.56 %**, **an authorized service agent shall adjust the span, perform maintenance on the belt-conveyor scale system, and schedule an official test with statutory authority.** ~~but does not exceed 0.75 %.~~
(Amended 1991 and 200X)
- ~~If the error is greater than 0.75 %, an official test is required.~~
(Amended 1987)

To comment on this proposal, contact Steven Cook, NIST Technical Advisor to the NTETC Belt-Conveyor Scales Sector, by e-mail at steven.cook@nist.gov, by telephone at (301) 975-4003, by fax at (301) 975-8091, or by postal mail at NIST WMD, 100 Bureau Drive MS 2600, Gaithersburg, MD 20899-2600.

Part 3, Item 1, Liquid-Measuring Devices: T.5. Predominance – Retail Motor-Fuel Devices

Source: Central Weights and Measures Association (CWMA)

Recommendation: The CWMA recommends withdrawing its earlier proposal (to add a new paragraph G-UR.4.1.1. to the General Code) and replacing it with the following new proposal developed by the Nebraska Weights and Measures Division to add a new paragraph T.5. to HB 44 Section 3.30. as follows:

T.5. Predominance – Retail Motor-Fuel Devices. – The retail motor-fuel devices in service at a single place of business shall be considered maintained in proper operating condition when evaluation of normal test results indicate the following parameters are met:

- (a) **The number of meters with minus test errors in excess of one-half maintenance tolerance shall be less than 60 % of the meters at the location, and**
- (b) **When there are three or more meters of a single grade or type of fuel, the average error of the meters shall not be a minus value exceeding one-half maintenance tolerance. Meter test results that exceed maintenance tolerance shall not be included in determining the average meter error of a single grade or type of fuel.**

(Added 200X)

In 1991, this same topic was brought before the NCWM as an information item. The intent of the proposal at that time was to provide guidance to states in the interpretation of General Code paragraph G-UR.4.1. Maintenance of Equipment. In 1993, the state of Wisconsin adopted a policy that defined “predominance” as shown in the proposal. That policy was similar to the one proposed in 1991, except Wisconsin felt that one-third acceptance tolerance was too stringent because there was a need to take into account normal variability in testing procedures, equipment, and environmental conditions found in the field. Wisconsin, therefore, adopted a “greater than one-third” maintenance tolerance guideline. In 2003, the Wisconsin policy was further refined by deleting the language “all devices are found to be in error in a direction favorable to the device user.” The new guideline for permissible errors was “60 % or more of the devices are found to be in error in favor of the device owner/user by more than one-third of the maintenance tolerance.” Both of these criteria were seldom used in the field because they made the policy confusing.

Recently NIST conducted a national survey of retail motor-fuel dispenser testing, and the results pointed to a need to gain more uniformity in the application of tolerances. There is a wide variation in how different states handle the “predominance” question. Strides should be continually made to gain uniformity. Adoption of the proposed new paragraph G-UR.4.1.1. would be one step toward gaining greater uniformity. With more than 5 years of history using the proposed criteria, Wisconsin saw a relatively low number of devices rejected on the basis of “predominance,” and most station owners and all service companies have a working understanding of predominance.

In 2005, the CWMA agreed to submit the modified proposal to the NCWM S&T Committee with a recommendation that it be placed on the Committee’s agenda as a developing item.

At their fall 2006 meetings, NEWMA, the SWMA, and the WWMA considered an earlier CWMA proposal to modify a General Code requirement and set limits on how to determine predominance in favor of the device operator. NEWMA believes the item is addressed adequately in HB 44, and recommends it be withdrawn from the NCWM S&T Committee’s 2007 agenda. The SWMA recommends that this Item, remain “developing” as a user requirement in the General Code. The SWMA encourages the jurisdictions to review the proposed policy and try it out. The WWMA considered the limits in the proposal too stringent given the effects of temperature and other uncertainties. The WWMA is concerned dispensers will be set to the limits in the proposal rather than as close as practical to zero error. The current General Code adequately addresses predominance, and jurisdictions may establish policy to gain uniformity in determining predominance. Consequently, the WWMA recommends this proposal be withdrawn from the agenda.

At the 2007 NCWM Interim Meeting, the Committee considered proposals to withdraw this item from its agenda. However, because a jurisdiction involved in developing the current proposal indicated their intention to provide the Committee with considerable data and continue further development of the item, the Committee agreed to keep Part 2, Item 1 on its agenda as a developing item through 2007.

Part 3, Item 2 Liquid-Measuring Devices: Price Posting and Computing Capability and Requirements for a Retail Motor-Fuel Dispenser (RMFD)

Source: WMD and all Regional Associations

Recommendation: Review and update NIST HB 44 requirements that address RMFD pricing and computing capability. This issue is under development and not ready for committee action.

Background/Discussion: In the early 1990s, various sections of the Liquid-Measuring Devices Code in HB 44 (including paragraphs S.1.6.4. Display of Unit Price and Product Identity, S.1.6.5.4. Selection of Unit Price, UR.3.2. Unit Price and Product Identity, and UR.3.3. Computing Device) were modified to address multi-tier pricing applications such as cash-credit. Since that time, marketing practices have evolved and recent years have seen the addition of new practices such as frequent shopper discounts and club member discounts. Numerous questions have been posed to the WMD regarding the requirements for posting unit prices, calculation of total price, customer-operated controls, and other related topics such as the definitions for associated terminology.

It is clear from these questions that changes are needed to HB 44 to ensure the requirements adequately address current marketplace conditions and practices. WMD has raised this issue with the NCWM S&T Committee and has also discussed a variety of pricing practices with individual state and local weights and measures jurisdictions.

NIST WMD is now in the process of reviewing the existing requirements and their application to current market practices. WMD has collected information on a number of scenarios, including the following: (Note: The conditions under some of these scenarios may not typically fall under the authority of weights and measures jurisdictions.)

- | | |
|--|--|
| (1) Frequent shopper discounts | (8) Full Service |
| (2) Club member discounts | (9) Self Service |
| (3) Discount for prepaying cash (to prevent "drive-offs") | (10) Progressive discounts based on volume of motor-fuel purchased |
| (4) Prepay at the cashier for credit sales | (11) Coupons for discounts on immediate or future purchases |
| (5) Discounts for purchasing store products | (12) Rebates (e.g., use of oil company credit card) |
| (6) Discounts for purchasing a service (e.g., carwash) | (13) Day-of-the-Week Discounts |
| (7) Targeted group discounts (e.g., Tuesday-Ladies 5 cents off per gallon) | |

WMD is interested in receiving input from the weights and measures community about the various practices and pricing structures in use. Working with input from the weights and measures community, WMD plans to introduce proposed modifications to current requirements through the regional weights and measures associations and technical committees. In the meantime, WMD welcomes opportunities to discuss this issue at regional weights and measures associations to ensure the issue is adequately addressed.

The WWMA acknowledged that marketing practices change on a daily basis and the task to ensure HB 44 codes address each scenario is monumental. However, the WWMA encourages NIST in its efforts to tackle this ongoing issue. Therefore, the WWMA recommends this issue be considered and move forward to the national level as a developing item.

The CWMA recommends that the State Directors compile information regarding whether or not they are enforcing the Liquid-Measuring Devices Code in HB 44 (including paragraphs S.1.6.4. Display of Unit Price and Product Identity, S.1.6.5.4. Selection of Unit Price, UR.3.2. Unit Price and Product Identity, and UR.3.3. Computing Device). If they are not enforcing the specific code requirement, it should be stated why not (for example, overriding state statute). Information is to be sent to:

James Truex, Chief	Phone: (614) 728-6290
Division of Weights and Measures	Fax: (614) 728-6424
8995 E. Main Street	E-mail: truex@mail.agri.state.oh.us
Reynoldsburg, Ohio 43068	

NEWMA looks forward to further development of this item.

The SWMA recommends adding this item to the NCWM S&T Committee's 2007 Agenda as a developing item.

At the 2007 NCWM Interim Meeting, the Committee agreed to add this proposal to its agenda as a developing item.

To comment on this proposal, contact NIST technical advisors to the NCWM S&T Committee: Steve Cook at steven.cook@nist.gov, or by telephone at (301) 975-4003, or Richard Suiter at richard.suiter@nist.gov, or by telephone at (301) 975-4406, or either by fax at (301) 975-8091, or by mail at NIST WMD, 100 Bureau Drive MS 2600, Gaithersburg, MD 20899-2600.

Part 4, Item 1 Water Meters: UR.2.1. Accessibility for Reading

Recommendation: Add a new paragraph UR.2. to HB 44, Section 3.36. Water Meters, as follows:

UR.2. Accessibility for Reading. – A water meter shall be so located that there is reasonable access to obtain a reading by means of the primary indicating element or a remote indicating element. Otherwise, it shall be the responsibility of the device owner or operator to make available, within 24 hours of a request being received by the owner or operator from a current lessee, mortgagee, or titleholder, the necessary labor and support to provide the consumer a means to obtain a meter reading, provided such requests are made with a frequency consistent with the normal billing cycle of the utility.

The WWMA also considered an alternate proposal developed by the California Division of Measurement Standards (DMS) to add new paragraph UR.2.1. to the Water Meters Code as follows:

UR.2.1. Accessibility of Customer Indication. – An unobstructed standing space of at least 30 in wide, 36 in deep, and 78 in high shall be maintained in front of an indication intended for use by the customer to allow for reading the indicator. The customer indication shall be readily observable to a person located within the standing space without necessity of a separate tool or device.

Industry Position: The industry proposal is intended to assist enforcement personnel in properly and uniformly enforcing the applicable regulations for obtaining meter readings. The proposed language is more appropriate than: 1) trying to define inherently ambiguous and subjective terms like “reasonable” and “ordinary circumstances” or 2) defining specific height requirements that insure visibility for customers and/or officials. Proposed new paragraph UR.2.1. Accessibility for Reading should be added to Section 3.36 Water Meters Code of HB 44 because there needs to be language which describes acceptable and applicable provisions.

Industry members stated that existing language in General Code paragraphs G-UR2.1.1. and G-UR.3.3. includes terms such as “reasonable” and “readily observable” which are subjective requirements; it is not possible to understand the installation requirements without relying on each local authority’s interpretation of these terms, which varies even within the same jurisdiction.

Water submetering locations are in a vast majority of cases NOT chosen by the service agency or the property/meter owner, but are dictated by the engineers and architects who use both national and state building and plumbing codes as their primary guide.

The regulation which is most commonly cited on notices of violation for register visibility issues is paragraph G-UR.3.3. Position of Equipment. HB 44 defines direct sale as “a sale in which both parties in the transaction are present when the quantity is being determined....” Industry notes that paragraph G-UR.3.3. is being misapplied and should have no bearing on a water submeter since both parties are **not** present when the quantity is determined. Furthermore, the antonym of a direct sale would be an indirect sale. NIST HB 130, Packaging and Labeling, Section 11. Exemptions, Subsection 11.1.1 Indirect Sale of Random Packages gives examples of indirect sales, several of which are exact examples of how water-submetering bills are paid. Examples of such indirect methods include on-line bill payments, phone bill payments, fax bill payments, and bill payments by mail.

Since water submetering is typically billed on a monthly cycle and since water submetering is not a direct sale where both parties are present at the time of the transaction, accessibility requirements for reading water meters should not

be the same as those enforced on direct sale devices where transactions take place frequently and with both parties present.

If the interpretation of the terms “reasonable and readily observable” continue to be enforced as they are currently, many meter owners will choose to abandon their systems for alternative billing methods such as “remote utility billing service” (RUBS) because re-plumbing existing water lines within walls is costly to building and coop/condo owners. This is especially true because there is no framework in place to know how to perform such a plumbing retrofit so that the work will be compliant with all interpretations of “reasonable” and “readily observable.”

A detailed, 12-month sampling of call center complaints from California properties showed that not a single complaint about the difficulty in obtaining a water meter reading had been received.

Regional Association Positions:

HB 44, Water Meters Code paragraph S.1.1.1. General permits a remote display as long as it is “readily accessible to the customer.”

The industry proposed language is no more definitive than existing language. The industry proposal removes the requirement for providing a readily accessible customer indicator. The California DMS alternative language would remove the vagueness from the current requirement while providing flexibility to installers.

Property owners do not read the indicators on each meter or they would be placed in a more convenient reading location. With remote reading, however, many meters are now being placed in inaccessible locations. Hardware is being installed to permit remote readings for billing purposes, but not for customers’ use.

Complaints have been lodged where the remote billing did not match the meter readings and we believe customers should be able to monitor easily their actual use without involving the property owner. Occasionally disputes exist between the property owner or manager and tenants that make requesting assistance a less desirable solution to reading a meter for verification.

The industry in California has been advised that remote customer indications are permissible. However, industry has not submitted devices for California DMS type evaluation. Between better planning for the installation of future meters and submitting remote indicators to be approved for use by customers, this problem can be resolved in a manner more consistent with other device applications.

The WWMA considered a proposal developed by industry and an alternate recommendation developed by California DMS. The industry proposal permits access to indications either through a primary indicator or a remote indicator, or requires the operator to provide a means for customer access to meter indications when given 24 hours’ notice within a billing cycle. The California DMS proposal specifies the dimensions for a clear, unobstructed perimeter surrounding the device to ensure accessibility for viewing meter indications.

The WWMA acknowledged that a device used to submeter a utility service is commercial equipment that presents a unique set of circumstances because the customer making the purchase does not observe the entire measurement operation, but receives a bill on a periodic cycle based on meter indications. In some cases, the operator/meter owner may be offsite and not required to observe primary meter indications, and may not be familiar with the unusual plumbing configurations that make it difficult to install an accessible meter and to read a meter. Consequently, no one General Code or Water Meter Code requirement appears to provide a complete and uniform set of guidelines that specify all conditions for making meter indications available so that the consumer can verify the measurement and allow the official to conduct an inspection. Some jurisdictions have developed policies to address this situation. In 2002 paragraph S.1.1. was modified to ensure that when indications are remote they remain accessible to the customer.

In any case, requirements and jurisdiction policies should address the needs of the customer and the official for access to meter indications without placing an undue burden on the operator or customer, and they should not deter a customer from making a legitimate complaint. It is essential in the marketplace to have all components used in

determining utility charges transparent; this includes meter indications that are available to all parties involved in the transaction.

The WWMA agreed that each proposal has some elements necessary to address meter accessibility and indicator accessibility. Therefore, the WWMA recommends the proposal become a developing item to allow time to rework the text so that there are uniform guidelines to fully address accessibility and include the following points: (1) Installation and location is such that there is no obstruction of the meter or indications, and (2) Indications are accessible for viewing by the customer and official without the use of tools separate from the device.

The WWMA encourages the California DMS and industry to work together to develop a proposal for regional consideration.

At the fall 2006 CWMA meeting, there was discussion that LP gas, natural gas, and electric meters should be included in this proposal; however, the CWMA did not submit any additional language at this time.

The SWMA supported the proposal moving forward as a developing item on the NCWM S&T Committee's 2007 Agenda.

At the 2007 NCWM Interim Meeting, the Committee agreed to add this proposal to its agenda as a developing item.

To comment on this proposal, contact Ken Lake, California Division of Measurement Standards, by e-mail at klake@cdfa.ca.gov or by telephone at (916) 229-3047.