

# Report of the Specifications and Tolerances Committee

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Reference  
Key Number

## 300 INTRODUCTION

This is the final report of the Committee on Specifications and Tolerances (S&T) (hereinafter referred to as the “Committee”) for the 93<sup>rd</sup> Annual Meeting of the National Conference on Weights and Measures (NCWM). The report is based on the Interim Report offered in the NCWM Publication 16, “Committee Reports,” testimony at public hearings, comments received from the regional weights and measures associations and other parties, the addendum sheets issued at the Annual Meeting, and actions taken by the membership at the voting session of the Annual Meeting.

Table A identifies the agenda items in the report by Reference Key Number, Item Title, and Page Number. The item numbers are those assigned in the Interim Meeting agenda. Voting items are indicated with a “V,” or if the item was part of the Voting Consent calendar by the suffix “VC” after the item number. Items marked with an “I” after the reference key numbers are Information items. Items marked with a “D” after the key numbers are Developing items. The Developing designation indicates that an item, while it has merit, may not be adequately developed for action at the national level. Items marked “W” have been withdrawn from consideration. Items marked with a “W” will generally be referred to the regional weights and measures associations because they either need additional development, analysis, and input or did not have sufficient Committee support to bring them before NCWM. Table B lists the appendices to the report, Table C identifies the acronyms for organizations and technical terms used throughout the report, and Table D provides a summary of the results of the voting on the Committee’s items and the report in entirety.

This report contains recommendations to amend National Institute of Standards and Technology (NIST) Handbook 44, 2008 Edition, “Specifications, Tolerances, and Other Technical Requirements for Weighing and Measuring Devices.” Proposed revisions to the handbook are shown in **bold face print** by ~~striking out~~ information to be deleted and underlining information to be added. New items proposed for the handbook are designated as such and shown in **bold face print**.

**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 submitted. Therefore, the report may contain references to inch-pound units.

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**Table C  
Glossary of Acronyms**

AWS	Automatic Weighing Systems	NEWMA	Northeastern Weights and Measures Association
BCS	Belt-Conveyor Scales	NIST	National Institute of Standards and Technology
CC	Certificate of Conformance	NTEP	National Type Evaluation Program
CWMA	Central Weights and Measures Association	NTETC	National Type Evaluation Technical Committee
EPO	Examination Procedure Outline	NW&SA	National Weighing and Sampling Association
GS	Grain Analyzer Sector	OEM	Original Equipment Manufacturer
GMM	Grain Moisture Meters	Pub 14	NCWM Publication 14
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	WG	Work Group
MDMD	Multiple Dimension Measuring Devices	WMD	NIST Weights and Measures Division
MFM	Mass Flow Meter	WS	NTETC Weighing Sector
MMA	Meter Manufacturers Association	WWMA	Western Weights and Measures Association
MS	NTETC Measuring Sector	USNWG	NIST/OIML U.S. National Working Group
NCWM	National Conference on Weights and Measures, Inc.	VTM	Vehicle-tank Meters
“Handbook 44” (HB 44) means the 2008 Edition of NIST Handbook 44 “Specifications, Tolerances, and Other Technical Requirements for Weighing and Measuring Devices”			
“Handbook 130” (HB 130) means the 2008 Edition of NIST Handbook 130 “Uniform Laws and Regulations in the Areas of Legal Metrology and Fuel Quality”			
<b>Note:</b> NIST does not imply that these acronyms are used solely to identify these organizations or technical topics.			

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**Table D**  
**Voting Results**

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Reference Key Number	House of State Representatives		House of Delegates		Results
	Yeas	Nays	Yeas	Nays	
300 (Consent Calendar)	38	0	33	0	Passed
310-4	24	13	19	15	Returned to Committee
320-5	37	1	27	1	Passed
300 (Report in its Entirety Voice Vote)	All Yeas	No Nays	All Yeas	No Nays	Passed

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

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**310 GENERAL CODE****310-1 I G-S.8. Provision for Sealing Electronic Adjustable Components, G-S.8.1. Access to Calibration and Configuration Adjustments, and G-S.8.2. Automatic or Semi-automatic Calibration Mechanism.**

**Source:** Southern Weights and Measures Association (SWMA)

**Recommendation:** Amend General Code paragraph G-S.8. as follows:

*G-S.8. Provision for Sealing Electronic Adjustable Components. – A device shall be designed with provision(s) for applying a security seal that must be broken, or for using other approved means of providing security (e.g., data change audit trail available at the time of inspection), before any change that detrimentally affects the metrological integrity of the device can be made to any electronic mechanism.*  
[Nonretroactive as of January 1, 1990]

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

(Added 1985) (Amended 1989 and **2008**)

Add new General Code paragraphs G-S.8.1. and G-S.8.3., and renumber previous G-S.8.1. to G-S.8.2. as follows:

**G-S.8.1. Access To Calibration and Configuration Adjustments. – A device shall be so designed that:**

- (a) **The application of the physical security seal automatically disables the access, including external and remote access, to the calibration and configuration mode, or**
- (b) **The calibration and configuration adjustments, including external and remote access, are protected by an approved audit trail, and in addition:**
  - **The device shall not provide metrological indications that can be interpreted, or transmitted into memory, or printed while it is in the calibration and/or configuration adjustment mode as a correct measurement value, or**
  - **The device shall clearly and continuously indicate that it is in the calibration and/or configuration adjustment mode and record such message if capable of printing in this mode.**

**(Nonretroactive as of January 1, 2009)**

**(Added 200X)**

**G-S.8.42. Multiple Weighing or Measuring Elements that Share a Common Provision for Sealing. – A change to any metrological parameter (calibration or configuration) of any weighing or measuring element shall be individually identified.**

*[Nonretroactive as of January 1, 2010]*

**Note:** For devices that utilize an electronic form of sealing, in addition to the requirements in **G-S.8.42.**, any appropriate audit trail requirements in an applicable specific device code also apply. Examples of identification of a change to the metrological parameters of a weighing or measuring element include, but are not limited to:

- (1) a broken, missing, or replaced physical seal on an individual weighing, measuring, or indicating element or active junction box;
- (2) a change in a calibration factor or configuration setting for each weighing or measuring element;
- (3) a display of the date of calibration or configuration event for each weighing or measuring element; or
- (4) counters indicating the number of calibration and/or configuration events for each weighing or measuring element.

(Added 2007)

**G-S.8.3. Automatic or Semi-automatic Calibration Mechanism. – A device may be fitted with an automatic or a semi-automatic calibration mechanism. This mechanism shall be incorporated inside the device. After sealing, neither the mechanism nor the calibration process shall facilitate fraud.**

(Added 1993)

**Background/Discussion:** At its 2007 Annual Meeting, the SWMA received a proposal to add requirements to G-S.8. to assure that a device could not be sealed in the configuration mode and continue to operate normally. Such a condition could facilitate fraud. The proposal as submitted required that a device continuously indicate when access to the set-up mode was not disabled. The SWMA heard comments that manufacturers can incorporate into a device ways to indicate a device is in the calibration mode other than having an enunciator or other indication. Manufacturers also believe any changes to the requirements need to be nonretroactive. The SWMA S&T Committee agreed and modified the original proposal as shown above. The SWMA agreed to forward the modified proposal to the NCWM S&T Committee with a recommendation that it be a Voting item on the Committee's agenda.

At the 2008 Interim Meeting, the Committee and the Meter Manufacturers Association (MMA) supported the proposal as presented. The Scale Manufacturers Association (SMA) recommended that, "The device shall provide an indication that it is in the setup mode." The Committee received a comment that as written the requirement that the device automatically exit the configuration mode after 60 minutes would not allow for a shorter time frame.

The Committee reviewed the comments received during the open hearing and discussed the alternate proposals provided by WMD and SMA. The Committee agreed that if a device designed for commercial applications is capable of being "sealed" with external or remote access to the calibration or configuration mode, it is clearly in violation of the current G-S.8. Provision for Sealing Electronic Adjustable Components and G-S.2. Facilitation of Fraud and, therefore, no change to the existing language is needed. However, because of the ongoing disagreement on the interpretation of G-S.8. among the NTEP Laboratories, the Committee agreed to make changes to the proposal based on the concerns raised during the open hearing.

The changes to the original proposal make a distinction between configuring a device to either enable or disable external or remote access to the calibration and configuration modes and taking the device out of a normal mode of operation and putting it into a special mode of operation where adjustments are made to calibration and configuration parameters. In other words, if the internal position of a switch or jumper enables external access to the calibration and configuration modes, the device will operate normally until an operator takes action such as entering a pass code, depressing and holding down a specific key, or uses other means to enter a special operating mode to make adjustments to calibration and configuration parameters. The Committee also believed that an indication for the adjustment mode of operation is only necessary for devices with approved category 1, 2, or 3 audit trails and that it not be operable in normal weighing or measuring operation.

The revised proposal states that:

- In the case of a device with a physical security seal, the application of the seal means that the external or remote access that enables the calibration and configuration modes is automatically disabled.

- In the case where a device has an approved audit trail, the device would be required to clearly and continuously indicate on the display (and printed if equipped with a printer) that it is in a calibration mode and not the normal operating mode.

The Committee did not include the proposed time limits for devices to remain in the calibration/configuration mode because suitable times are different for different types of devices. For example, a 15 kg scale is likely to need less time to adjust than a vehicle scale or wholesale meter. The Committee is also aware of NTEP evaluation procedures that require indications and recorded representations (while in the adjustment mode) be either clearly identified as being in the calibration or configuration adjustment mode by means of words, symbols, codes, or that metrological indications cannot be interpreted as valid measurements. The Committee decided to present the amended proposal as shown in the recommendation for a vote at the Annual Meeting.

The Committee received the report of the SMA's 2008 spring meeting. The SMA supported the need for clarification of G-S.8. and stated that paragraph G-S.8.1. part (a) in the above recommendation changed the original intent of the physical security seal and the wording of part (b) could be accomplished by changing the following wording to replace the current recommendation:

**G-S.8.1. Access To Calibration and Configuration Adjustments. – A device shall be so designed that access to calibration and configuration mode shall be protected by an approved category 1, 2, or 3 method of sealing, and shall clearly indicate to the operator when in this mode.**

The Committee agreed with comments from the CWMA, NEWMA, and the NTEP participating laboratories 2008 spring meeting reports to delete the words “category 1, 2, or 3,” and add language that the device shall clearly and continuously indicate and print, if equipped with a printer, that the calibration and configuration adjustment mode is enabled or that the device shall not operate while in this mode or shall not display a usable quantity value. NEWMA recommended that this item be made informational to allow more time for the NCWM and other interested parties to review and analyze the alternate proposals from the CWMA and SMA.

At the 2008 Annual Meeting, the Committee heard comments from WMD which noted that the alternate language submitted by SMA would require that *all* devices in the calibration mode provide indications to the operator. This would encompass mechanical and electronic, and devices that use category 1 physical seals. Additionally, WMD believes that a device does not need an indication that is in a calibration or configuration mode if it is incapable of providing indications that can be interpreted, printed, or transmitted to a memory device as a correct measurement value. WMD suggested that the committee amend the recommendation to address some of the concerns noted by the CWMA, NTEP participating laboratories, and WMD since the 2008 Interim Meeting.

The Committee agreed with the comments from the CWMA, and WMD and amended paragraph G-S.8.1. as shown in the recommendations to:

- delete the references to the sealing categories of device,
- clarify printing requirements, and
- include an option that the device not operate or provide metrological indications that can be interpreted, or transmitted into memory or to recording elements while in this mode.

Just prior to the voting session, it was noted that the revised language in G-S.8.1.(a) had been inadvertently changed, and that it could be interpreted to mean that the physical seal itself disabled access to the adjustment mechanisms instead of simply preventing access to the mechanism. Consequently, the Committee changed the status of the item from Voting to Informational. The Committee believes that the intent of the recommendation is to ensure that the access to the calibration and configuration modes is disabled.

The Committee redrafted the language in paragraph G-S.8.1. and will submit the following revised language for G-S.8.1. to the regional weights and measures associations for further review and consideration.

**G-S.8.1. Access To Calibration and Configuration Adjustments. – A device shall be so designed that access to calibration and configuration modes, including external and remote access, are only permitted when:**

**(a) The application of the physical security seal shall ensure that the access to the calibration and configuration modes is disabled, or**

**(b) The calibration and configuration adjustments are protected by an approved audit trail, and the device shall clearly and continuously indicate and print, if equipped with a printer, that the calibration and configuration adjustment modes are enabled.**

**(Nonretroactive as of January 1, 2009)**

**(Added 200X)**

### **310-2 I Appendix D – Definition of Electronic Devices, Software-Based**

**Source:** Carryover Item from 2008. This item originated from the NTETC Software Sector and first appeared on the Committee’s 2007 Agenda as Developing Item Part 1, Item 2 and was placed on the Committee’s Interim Agenda as Item 320-2 and was then returned back to Item 360-2 Developing Items in the Committee’s Interim Report to the NCWM.

**Recommendation:** Add a new definition and cross-reference term to Appendix D in HB 44 for “Electronic devices, software-based” as follows:

**Electronic devices, software-based. Weighing and measuring devices or systems that use metrological software to facilitate compliance with Handbook 44. This includes:**

**(a) Embedded software devices (Type P), aka built-for-purpose. A device or element with software used in a fixed hardware and software environment that cannot be modified or uploaded via any interface without breaking a security seal or other approved means for providing security, and will be called a “P.” or**

**(b) Programmable or loadable metrological software devices (Type U), aka not-built-for-purpose. A personal computer or other device and/or element with PC components with programmable or loadable metrological software, and will be called “U.” A “U” is assumed if the conditions for embedded software devices are not met.**

**Software-based devices – See Electronic devices, software-based.**

**Background/Discussion:** During the NTETC Software Sector discussion on marking requirements and G-S.1.1. Location of Identification Information, it was initially suggested that the term “not-built-for-purpose” be removed from the wording in NIST HB 44 paragraph G-S.1.1. since there is no definition for a not-built-for-purpose device in HB 44. After a lengthy discussion related to the terms “built-for-purpose” and “not-built-for-purpose,” the Sector agreed these terms were not clear and should be replaced with the terminology proposed above. The proposed definitions are based on the revision of OIML R 76 Non-automatic weighing instruments subSections 5.5.1. (Type P) and 5.5.2. (Type U).

At the 2008 Interim Meeting, the SMA supported the intent of the item, but stated that it is premature to place these definitions in HB 44. The SMA recommended that the status of the item be changed to Developing on the S&T Committee Agenda. The Committee agreed to move Item 310-2 of the 2008 S&T Committee Interim Agenda and assign Developing status as 360-2 Part 1, Item 2.

At the 2008 Annual Meeting, the Committee heard comments from the former NTETC Software Sector Chairman indicating that the Sector had completed its review of this item and could not develop it any further. The Chairman requested that the Committee consider moving the item from the Developmental section of the agenda and at least make it an Information item on the Committee’s agenda to facilitate discussion and comment on the proposed language.

The Software Sector has indicated that it has completed its work on the item and noted that sufficient information (including specific proposed language) was included in the submission to enable action by the Committee;

consequently, the Committee agreed to change the status of the item from Developmental to Informational and will forward the item to the regional weights and measures associations.

### 310-3 V G-A.1. and Appendix D – Definition of Equipment

(This item was adopted.)

**Source:** Carryover Item 310-1B. (This item originated from the 2007 Committee during discussion on agenda Item 310-1A General Code, paragraph G-S.2. Facilitation of Fraud.)

**Recommendation:** Modify G-A.1.(a) and add a new definition to Appendix D in HB 44 for “equipment” as follows:

**G-A.1. Commercial and Law-Enforcement Equipment.** – These specifications, tolerances, and other technical requirements apply as follows:

(a) To commercial weighing and measuring equipment; that is, to weights and measures and weighing and measuring devices commercially used or employed in establishing the size, quantity, extent, area, **composition (limited to meat and poultry), constituent value (limited to grain)**, 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.

**(Amended 2008)**

#### **Appendix D**

**equipment, commercial. Weights, measures, and weighing and measuring devices, instruments, elements, and systems or portion thereof, used or employed in establishing the measurement or in computing any basic charge or payment for services rendered on the basis of weight or measure. As used in this definition, measurement includes the determination of size, quantity, value, extent, area, composition (limited to meat and poultry), constituent value (limited to grain), or measurement of quantities, things, produce, or articles for distribution or consumption, purchased, offered, or submitted for sale, hire, or award. [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]**

**commercial equipment, See equipment**

**Background/Discussion:** During the Committee’s 2007 discussion of agenda Item 310-1 Facilitation of Fraud, the Committee agreed there was a need to define the term “equipment.” The Committee believed the proposed definition will help prevent misinterpretation of the term as used in paragraph G-S.2. and several other HB 44 codes. The proposed definition is intended to clarify which parts or portions of a device or system must comply with applicable specifications, tolerances, and other technical requirements in HB 44. The Committee recommended the proposed definition be carried over to allow sufficient time for a review of the proposed definition.

For additional background information, refer to the Committee’s 2007 Interim and Annual Reports.

At its 2007 Annual Meeting, the WWMA supported the intent of the proposal. The WWMA recommended the proposed language be split into two sentences and recommended the proposal move forward as a Voting item on the NCWM S&T Committee Agenda.

The CWMA and NEWMA supported the intent of the proposal, agreed with the changes to the proposed definition recommended by the WWMA, and recommend the proposal move forward as a Voting item on the NCWM S&T Committee Agenda.

At the 2008 Interim Meeting, the Committee heard no opposition to the item. The Committee received a recommendation to modify G-A.1. to: (1) add the words “composition, constituent value” to include the

measurements provided by Near-Infrared Grain Analyzers and Electronic Livestock, Meat, and Poultry Evaluation Systems and/or Devices, and (2) to modify the definition of “equipment” to include law enforcement and statistical information collection devices. The Committee modified the proposal as shown above and agreed to present it for a vote at the NCWM Annual Meeting.

At the 2008 Annual Meeting, the Committee agreed with the reports of the CWMA and NEWMA 2008 spring meetings that stated that the words “composition” and “constituent” need better definitions to make sure that the additional words do not broaden the scope of HB 44. The Committee also agreed with a suggestion from the Grain Inspection, Packers, and Stockyards Administration (GIPSA) to include the words “meat and poultry” to limit the scope of “composition.” The Committee believed that the word “grain” should also be added to limit the scope of “constituent value” and amended the proposal to read as shown in the Committee’s recommendation.

### **310-4 V G-N.3. Verification of Testing Standards**

(This item did not pass or fail; therefore, it returns to the Committee.)

Note: This item was originally addressed under Item 330-2 in the Committee’s 2008 Interim Agenda. As a result of deliberations (see “Background/Discussion” below) at the 2008 Interim Meeting, the Committee decided to delete Item 330-2 and to address the issue in this new Item 310-4, which proposes adding a paragraph to the General Code to designate general requirements for all field standards. At the 2008 NCWM Annual Meeting, the Committee decided (as a result of comments received following the Interim Meeting) to reinstate Item 330-2 (which proposes an addition to the Liquid-Measuring Devices Code to specify pour and drain times for measuring device test standards) as an Information item; the Committee’s rationale for this decision is outlined in Item 330-2 of this report. Note, however, that the Committee retained Item 310-4 and presented that item as a Voting item at the Annual Meeting.

**Source:** Central Weights and Measures Association (CWMA)

**Recommendation:** Add the following paragraph G-N.3. to the General Code:

**G-N.3. – Verification (Testing) Standards. – Field standards used in verifying weighing and measuring devices shall comply with the most current requirements of NIST Handbook 105 Series standards (or other suitable and designated standards) or the accuracy requirements expressed in Fundamental Considerations, Paragraph 3.2. (i.e., one-third of the smallest tolerance applied).**

**(Added 2008)**

Delete corresponding paragraphs in the Scales Code, Automatic Bulk Weighing Systems Code, and the Automatic Weighing Systems Code as follows:

**Scales Code:**

~~**N.2. Verification (Testing) Standards. – Field standard weights used in verifying weighing devices shall comply with requirements of NIST Handbook 105 Series standards (or other suitable and designated standards) or the tolerances expressed in Fundamental Considerations, Paragraph 3.2. (i.e., one third of the smallest tolerance applied).**~~

~~**(Amended 1986)**~~

**Automatic Bulk Weighing Systems Code:**

~~**N.2. Verification (Testing) Standards. – Standard weights and masses used in verifying weighing devices shall comply with requirements of NIST Handbook 105-1 (Class F) or the tolerances expressed in Appendix A, Fundamental Considerations, paragraph 3.2. (i.e., one-third of the smallest tolerance applied).**~~

**Automatic Weighing Systems Code:**

~~**N.1.3. Verification (Testing) Standards. — Field standard weights shall comply with requirements of NIST Handbook 105-1 (Class F) or the tolerances expressed in Fundamental Considerations, Paragraph 3.2. (i.e., one-third of the smallest tolerance applied).**~~

**Background/Discussion:** This item was originally presented as Item 330-2 on the Committee's 2008 Interim Agenda. The item was moved to Item 310-4. The Committee considered the following proposal from the CWMA to add a new paragraph N.4.6.:

**N.4.6. Pour and Drain Times for Hand-held Test Measures – Hand-held test measures require a 30-second (± 5 seconds) pour followed by a 10-second drain, with the measure held at a 10- to 15-degree angle from vertical.**

**(Added 200X)**

The CWMA noted that HB 44 does not address pour or drain times for 5 gal test measures used to test retail motor-fuel devices. However, the pour and drain time requirements are in HB 112 Examination Procedure Outline Numbers 21 and 22 for Retail Motor-fuel Dispensers in Test Notes paragraph 2. They are also referenced in NIST HB 105-3 Specifications and Tolerances for Graduated Neck-Type Volumetric Field Standards Section 7. Test Methods and References.

Metrology labs are not routinely requiring that hand-held (5 gal) test measures be labeled with this information when the information is missing. Additionally, many hand-held test measures used by service agents and agencies do not specify drain times. Service agents, as a result, are using incorrect pour and drain times.

At the 2008 Interim Meeting, the Committee agreed that rather than putting a requirement in HB 44 stipulating pour and drain times for provers and test measures, it is preferable to reference the requirements in NIST Handbook 105-3 as follows:

**N.4.6. Verification (Testing) Standards. – Field standard provers and test measures used in verifying measuring devices shall comply with requirements of, and used in accordance with, NIST Handbook 105-3 standards (or other suitable and designated standards) and the tolerances expressed in Fundamental Considerations, paragraph 3.2. (i.e., one-third of the smallest tolerance applied).**

**(Added 2008)**

The Committee noted that the NIST 105 series handbooks are already referenced in Appendix A – Fundamental Considerations of HB 44. The Committee also noted that pour and drain times are referenced in NIST HB 112 EPOs and are referenced in NIST training materials and training presented by NIST. The Committee questioned whether a lack of uniformity in the application of Handbook 105-3 criteria is sufficient technical justification for including requirements in HB 44. However, the Committee acknowledged the concerns raised by some jurisdictions regarding the need for service companies to apply proper drain times and discussed alternative approaches to assist those jurisdictions and to emphasize the need to follow Handbook 105 series criteria.

In its review of the issue, the Committee noted that several of the weighing devices codes in HB 44 already include similar paragraphs referencing requirements for test standards. Since the application of Handbook 105 criteria is universal to all devices covered by HB 44, as referenced in the Fundamental Considerations, the Committee believes that including a paragraph in the Notes section of the General Code to reference the Handbook 105 series is more efficient than including references in each specific code. Consequently, the Committee developed a proposal to add a new paragraph G-N.3. Verification (Testing) Standards to the General Code and delete corresponding Notes paragraphs currently in the Scales Code, Automatic Bulk-Weighing Systems Code, and the Automatic Weighing Systems Code as outlined in the recommendation above. The Committee agreed to present this item for a vote.

In its spring 2008 report, the CWMA S&T Committee indicated that it heard comments that field inspectors may not carry the NIST HB 105 series. Comments were also heard that the proposed item be code specific to eliminate any

confusion. The CWMA S&T Committee recommended that the item be included only in specific LMD code and not in the General Code.

In their spring 2008 report, NEWMA stated that some of the 105 series are out of date and that before this item is adopted, the series should be brought up to date. An example was made of 105-1 where OIML class F1/F2 is not recognized even though weights of that class are commonly used to test class II scales in the United States. NEWMA further stated that this should remain a Developing item while the 105 series is being updated by NIST.

The SMA stated that it supported this item at its 2008 spring meeting.

The Committee received comments from WMD indicating that, since pour and drain times are published in the EPOs and taught in WMD training, a reference to the 105 series in the General Code is more appropriate; particularly since NIST Handbook 105-3 Section 4.5.10.1 requires the marking of drain and delivery times on handheld test measures. With regard to concerns about update intervals for a particular 105 series handbook, WMD pointed out that the 105 series are already referenced in the Fundamental Considerations and have been for some time, and periods during which a handbook is being updated have apparently not posed any significant problems in the past. WMD also raised a concern over whether a trend for inclusion of references such as this in many individual codes might ultimately discourage the inspector and service company from referencing the Fundamental Considerations where other important information about necessary equipment and practices are found.

At the 2008 NCWM Annual Meeting, the Committee agreed that the proposed change to the General Code should remain as a Voting item since the language will provide guidance for device codes that do not specify the suitability and use of standards in the specific codes. The Committee also amended the proposal to address the concerns about the references to the term “tolerance” by changing the reference to the term “tolerances” to the words “accuracy requirements.”

The Committee heard comments during the open hearing that specific hand-held test measure user requirements are still needed in the LMD Code for weights and measures officials and service agents. Therefore, the Committee recommends that language originally submitted by the CWMA be reinstated in the Committee’s report as an Information item on the agenda.

## **320 SCALES**

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

(This item was adopted.)

**Source:** Carryover Item 320-2. (This item originated from the NTETC WS and first appeared on the Committee’s 2007 agenda.)

**Recommendation:** Amend S.1.1.1.(b) Digital Indicating Elements 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. A “center-of-zero” indication may operate when zero is indicated for gross or net mode(s).*

*[Nonretroactive as of January 1, 1993]*

(Amended 1992 **and 2008**)

**Background/Discussion:** This proposal was originally intended to clarify that the center-of-zero indicator may be operable when a zero condition exists in the net weight mode. At the 2007 NCWM Annual Meeting, the Committee heard testimony from the CWMA, NEWMA, and SMA stating that this item in the 2007 Interim Agenda had changed from the original intent (to verify that center-of-zero could be operable in the net mode) to include additional language which significantly altered the requirement. For example, using “and” instead of “or” at the end of paragraph S.1.1.1.(a), makes both requirements mandatory in both (a) and (b) of S.1.1.1. If “or” is used instead of “and,” then this proposal lowered the current requirement of  $\frac{1}{2} e$  to  $\frac{1}{4} e$ . The SMA further stated the proposal was not consistent with Canadian and OIML requirements because proposed paragraph (a) added a dual requirement for the “center-of-zero” indication. Therefore, the CWMA, NEWMA, and SMA recommended the status of the proposal be changed to Informational to allow time for further consideration.

At its 2007 Annual Meeting, the WS reviewed this item and agreed to support the WMD language as recommended in the 2007 NCWM S&T Committee Final Report on Agenda Item 320-2.

At their fall 2007 meetings, the CWMA and WWMA S&T Committees heard unanimous support for this proposal and agreed with the alternative language written by WMD. The CWMA and WWMA recommended the proposal incorporating the WMD alternate language as shown above move forward as a Voting item on the NCWM S&T Committee Agenda.

NEWMA believes the scale should not indicate a “center-of-zero” indication if the scale is displaying a negative weight when the tare object is removed from the load-receiving element after tare has been taken. Therefore, at its 2007 Interim Meeting, NEWMA supported the intent of this proposal but submitted an alternate note for paragraph S.1.1.1. as follows:

**Note: The “center-of-zero” indication may also work when zero is indicated in either the gross or net mode.**

During the 2008 NCWM Interim Meeting, the Committee heard support for the intent of the proposal and for the NEWMA recommendation to clarify that the center-of-zero indication is only applicable when there is an indication of zero (gross load zero or net load zero with an object on the scale). NIST WMD agreed with NEWMA since the NEWMA recommendation is consistent with the language in the 2007 Edition of NCWM Publication 14 Digital Electronic Scales Section 41. Zero Indication and OIML R 76-1 Metrological and Technical requirements for Nonautomatic Weighing Instruments clause 4.5.5. WMD suggested that the proposed sentence be added to the end of paragraph S.1.1. since a “stand-alone” note is not justified.

The Committee agreed with comments during the open hearing and the recommendations from NEWMA and WMD and made this item a Voting item in its Interim Report. The Committee received no opposition to the item prior to or at the 2008 Annual Meeting.

For additional background information, refer to the Committee’s 2007 Final Report.

### **320-2 V S.1.2.1. Weight Units, S.2.3. Tare, and T.N.2.1. General**

(This item was adopted.)

**Source:** Carryover Item 320-3. (This item originated from the NTETC WS and first appeared on the Committee’s 2007 agenda.)

**Recommendation:** Add a new note to paragraph S.1.2.1. and amend paragraphs S.2.3. and 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.*

**Note: The requirement that the value of the scale division be expressed only as 1, 2, or 5, or a decimal multiple or submultiple 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 multiple range or multi-interval scale may indicate and record tare weights in a lower weighing range (WR) or weighing segment (WS), gross weights in the higher weighing range or weighing segment, and net weights as follows:

$$\begin{array}{r} 55 \text{ kg} \text{ Gross Weight (WR2 } d = 5 \text{ kg)} \\ - 4 \text{ kg} \text{ Tare Weight (WR1 } d = 2 \text{ kg)} \\ \hline = 51 \text{ kg Net Weight (Mathematically Correct)} \end{array} \qquad \begin{array}{r} 10.05 \text{ lb Gross Weight (WS2 } d = 0.05 \text{ lb)} \\ - 0.06 \text{ lb Tare Weight (WS1 } d = 0.02 \text{ lb)} \\ \hline = 9.99 \text{ lb Net Weight (Mathematically Correct)} \end{array}$$

(Note added 2008)

[Nonretroactive as of January 1, 1989]

(Added 1987) **(Amended 2008)**

**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 weighing range or weighing segment), 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.\*

[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 1985 **and 2008**)

**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 load**only**.

**(Amended 200X)**

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

This proposal, which was developed by the Tare WG and supported by the WS, 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 proposed changes to S.1.2.1. requires that paragraph S.2.3. Tare also be amended as shown in the above proposal to avoid a conflict with the changes to paragraph S.1.2.1. Additionally, the Tare WG recommended changes to paragraph T.N.2.1. to clarify that tolerances in Table 6 also apply to net weight indications.

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).

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 incorporate the SWMA recommendation to modify paragraph S.2.3.

NEWMA pointed out that the proposed amendment to S.1.2.1. appeared to be permissive and not a requirement. NEWMA asked if the intent was to prohibit multi-interval and multiple range scales from rounding and indicating calculated net weights in scale divisions to only 1, 2, or 5 when appropriate or was rounding the scale divisions still

allowed. The WMD representative to the NCWM Tare WG stated that the intent was for the language to be permissive because there are a significant number of devices in the marketplace with an NTEP CC 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.,
- change the words “scale value” to “scale division” to be consistent with the terminology currently used in HB 44, and
- clarify 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 to the value of the scale division.

At its 2007 Annual Meeting, the WS reviewed the amended proposal and stated that the examples in the language carried over from the 2007 NCWM Annual Meeting did not provide enough information, such as the capacities of the weighing ranges or segments and the values of “d” for each weighing range or segment. Additionally, it was agreed that the second example should have a net value that is different from the first example.

At its 2007 Annual Meeting, the WWMA S&T Committee heard from the NTETC WS and SMA which supported the intent of this item. The WWMA recommended that the example be amended by changing the second paragraph of the note and by adding sample equations.

The CWMA and NEWMA agreed with the fall 2007 WS and WWMA recommendation. Additionally, the CWMA and WWMA recommend that this proposal move forward as a Voting item on the NCWM S&T Committee Agenda.

During the 2008 NCWM Interim Meeting, Ross Andersen, New York, commented that the proposal is different from what is currently permitted in Publication 14 in that the tare values for multi-interval and multiple range scales are rounded, indicated, and recorded to the nearest value of the net weight division if the net weight is in a higher weighing range or segment. Additionally, he noted that the proposal is also inconsistent with OIML R 76 since the value of the net weight division is expressed only as 1, 2, or 5. The NIST technical advisor responded that the Tare WG considered the differences between Pub 14 and OIML R 76. The Tare WG believes that the current tare requirements in Pub 14 forces tare in a lower range or segment to round up or down to the nearest division. In some cases, tare will be rounded to zero. This proposal increases the accuracy of the net weight calculated by the difference in the actual gross and tare values without introducing errors due to rounding tare and net weights to a larger d value when the gross weight is in a higher range or segment.

It should be noted that OIML R 76 is different from what is permitted in this proposal. OIML R 76 requires that printed weighing results be rounded to the nearest scale division of the actual weighing range or segment of each gross, tare and net result and permits a 1 d error in the calculation of net due to rounding. R 76 clause 4.6.12 “Examples of indications of weighing results” footnote 4 states:

- <sup>4)</sup> The displayed and printed weighing results (gross, tare weighing, net) shall be rounded each to the actual e (d). The e can be different depending on the actual weighing range or the actual partial weighing range, so a deviation of  $1 \times e (d)$  may be possible between the gross weighing result and the calculation of net and tare values.

The Tare WG concluded that neither of the current requirements in Publication 14 and R 76 were acceptable and recommended that the most accurate method to determine net weights is to perform an accurate mathematical calculation between the actual gross and net weights and to not require the net weight to comply with the requirement that it be expressed only as 1, 2, or 5.

The Committee heard support from the SMA for the proposal. The Committee believes that the alternate language submitted by WMD more clearly states the original intent of the proposal by deleting the second paragraph in the note and amending the examples submitted by the WWMA as shown in the above proposal. Don Onwiler commented that the NTEP laboratories have been discussing this issue for quite some time. Some of the NTEP labs believe that the tare should always round up to the favor of the customer. But that argument does not take into

account applications where the customer is selling product to the scale owner, in which case rounding tare up is always against the customer. Don added that this proposal is a compromise that results in a more accurate net weight determination and that he is in support of the proposal and commends the work of the Tare WG to resolve this issue.

At the 2008 Annual Meeting, the Committee agreed with comments from the SMA, the CWMA, and NEWMA to include the word “segment” in paragraph S.2.3., and amended the proposal as shown in the above recommendation.

For additional background information, refer to the Committee’s 2007 Annual Report.

**320-3 W S.1.7. Capacity Indication, Weight Ranges, and Units Weights**

(This item was withdrawn.)

**Source:** National Type Evaluation Technical Committee Weighing Sector

**Recommendation:** Modify paragraph S.1.7. as follows:

**S.1.7. Capacity Indication, Weight Ranges, and Unit Weights.**

- (a) Gross Capacity. An indicating or recording element shall not display nor record any values when the total platform 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.
- (b) *Capacity Indication. Electronic computing scales (excluding postal scales and weight classifiers) shall neither display nor record a gross or net weight in excess of scale capacity plus 9 d. [Nonretroactive as of January 1, 1993]*

**(c) Flashing weight values are not acceptable as an overload indication.**

The total value of weight ranges and of unit weights in effect or in place at any time shall automatically be accounted for on the reading face and on any recorded representation.

This requirement does not apply to: (1) single-revolution dial scales, (2) multi-revolution dial scales not equipped with unit weights, (3) scales equipped with two or more weighbeams, nor (4) devices that indicate mathematically derived totalized values.

(Amended 1990, 1992, ~~and 1995~~ **and 200X**)

**Background/Discussion:** During its review and discussion of the Tare WG recommendation, the WS reviewed a comment from the WG that paragraph S.1.7. should be amended to include a statement that flashing weight values are not an acceptable indication of over capacity. The Tare WG made this recommendation to the Sector while developing a new paragraph that limits tare operating range to the capacity of a scale. This language has been in NCWM Publication 14 as early as its 2<sup>nd</sup> Edition (1989) and was added when NTEP applicants submitted scales using flashing weight values to indicate an over-capacity condition since flashing weights could be written down and used for commercial weight determinations. The WS agreed with the Tare WG recommendation and requested that appropriate language, as shown above, be developed by the NIST technical advisor and submitted to the NCWM S&T Committee.

During the 2008 NCWM Interim Meeting, the SMA stated that they oppose this item and believe that the current wording in subparagraphs S.1.7. (a) and (b) sufficiently addresses the issue. The SMA added that the recommendation to add a new subparagraph (c) would lead to an open list of possible unacceptable designs (solutions). WMD agreed with the SMA and stated that the language in Publication 14 is an appropriate interpretation of S.1.7. (a) and (b). Additionally, Publication 14 could be clarified to state that the scale shall not display any measurement value when the capacity exceeds 105 % of the nominal capacity (9 d for computing scales).

The Committee agreed with the comments and noted that a flashing weight can be interpreted as a valid weight and, therefore, any indication of weight value shall not be displayed nor recorded when the total platform load is in excess of 105 % of scale capacity. Consequently, the Committee withdrew this proposal from the agenda in its Interim Report.

#### 320-4 V S.2.1.5. Initial Zero-Setting Mechanism

(This item was adopted.)

**Source:** National Type Evaluation Technical Committee Weighing Sector

**Recommendation:** Amend NIST Handbook 44, Section 2.20. Scales Code, paragraph S.2.1.5. as follows:

**S.2.1.5. Initial Zero-Setting Mechanism.** – ~~(a)~~ Scales of accuracy Classes I, II, and III may be equipped with an initial zero-setting device.

~~(a)~~ **For weighing, load-receiving, and indicating elements in the same housing or covered on the same CC.** An initial zero-setting mechanism shall not zero a load in excess of 20 % of the maximum capacity of the scale unless tests show that the scale meets all applicable tolerances for any amount of initial load compensated by this device within the specified range.

**(b) For indicating elements not permanently attached to weighing and load-receiving elements covered on a separate CC, the maximum initial zero-setting mechanism range of electronic indicators shall not exceed 20 % of the configured capacity.**  
**[Nonretroactive as of January 1, 2009]**

**(Added 2008)**

(Added 1990) **(Amended 2008)**

**Background/Discussion:** This item first appeared on the NTETC WS agenda in 2004. The Sector noted that Scales Code paragraph S.2.1.5. was clear about the requirements for Initial Zero-Setting Mechanism (IZSM) for complete scales. However, it did not address the requirements for separable weighing and indicating elements. Electronic indicating elements have been submitted to NTEP with an IZSM of 100 % of the configured capacity of the indicator. NTEP can easily test to verify IZSM requirements on these elements. However, the problem occurred when the separable load-receiving element (with a CC) was not tested for IZSM and was interfaced with an indicating element that had been tested for IZSM.

If the IZSM on the indicating element was configured to zero off 100 % of the scale capacity and then interfaced with a load-receiving element that had not been tested for IZSM, the load-receiving element could be inadvertently loaded to 200 % of its designed capacity even though it indicated only 100 % capacity. This would likely result in inaccurate weight determinations and/or damage to the scale.

NTEP only evaluates load-receiving elements up to 105 % of the capacity requested by the applicant and marked on the device. All Class I, II, and III separable weighing/load-receiving elements with NTEP CC's have not been submitted or tested with an IZSM feature unless the submission was to be treated as a complete scale with a specific indicating element. Therefore, there is a possibility that many load-receiving elements consisting of only load-cell support structures may not comply with an indicating element configured with IZSM enabled.

The WS believes that weighing, load-receiving, and indicating elements that are type evaluated together and listed on a single CC can be tested with an IZSM up to 100 % to assure compatibility between the indicating and weighing/load-receiving elements. Separable weighing/load-receiving elements are typically not tested for IZSM since the IZSM is a feature of the indicating element. The Sector considered and agreed that the 20 % limitation was an appropriate value for IZSM in developing the proposal to amend HB 44 paragraph S.2.1.5. based on OIML R 76 [Technical requirements for a self- or semi-self-indicating instrument paragraph 4.5.1. Maximum Effect (of IZSM), WELMEC 2-1 Guide for Testing Indicators] and Canadian requirements (LG-15.04 IZSM Range-Maximum Range of Initial Zero-Setting Mechanism).

At its 2007 Annual Meeting, the WWMA S&T Committee heard comments questioning why Class III L scales are not included in this proposal. A comment was also received to amend the proposal in subparagraph (c) to state that the IZSM “shall not exceed” 20 %. The WWMA S&T Committee agreed with the second comment and recommended amending the proposal as follows:

**S.2.1.5. Initial Zero-Setting Mechanism.**

**(c) For indicating elements not permanently attached to weighing and load-receiving elements covered on a separate CC, the maximum initial zero-setting mechanism range shall not exceed 20 % of the configured capacity.**

The WWMA agreed with the intent of the proposal and recommended this proposal, with modifications as shown above, become a Voting item, and that additional research be conducted before the Interim Meeting to determine why Class III L scales were omitted from the existing language in HB 44. (**Technical Advisor’s Note:** The 1990 NCWM Annual Report of the S&T Committee Agenda Item 320-1 stated that the Committee believed IZSM was not appropriate or necessary on vehicle scales or other Class III L scales.)

At its 2007 Interim Meeting, the CWMA agreed with the WWMA comment and recommendation.

During the 2008 NCWM Interim Meeting, the Committee heard unanimous support of the item and agreed with the WWMA comments to change the proposed phrase “**must be limited to 20 %**” to “**shall not exceed 20 %**” as shown in the recommendation above. The Committee made the proposal a Voting item.

At the 2008 Annual Meeting, the Committee agreed with a suggestion to eliminate the reference to railway track scales in the third paragraph in the background/discussion section of this item since IZSM has never been applicable to Class III L scales. The Committee subsequently amended the referenced paragraph in its Interim Report for the Final Report. The Committee also agreed to recommend 2009 as the nonretroactive date.

**320-5 V S.2.4. Level-Indicating Means and S.2.4.1. Vehicle On-Board Weighing Systems**

(This item was adopted.)

**Source:** Western Weights and Measures Association

**Recommendation:** Amend paragraphs S.2.4. and S.2.4.1. as follows:

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

*[This requirement is nonretroactive as of January 1, 1986, for prescription, jewelers’, and dairy-product-test scales, and scales marked I and II.]*

[Note: Portable wheel-load weighers and portable axle-load scales shall be accurate when **tilted up to and including 5 % rise over run in any direction from a level position and rebalanced.** ~~**placed out of level up to and including 5 % (approximately three degrees).**~~]

(Amended 1991 **and 2008**)

**S.2.4.1. Vehicle On-Board Weighing Systems.** – A vehicle on-board weighing system shall operate within tolerance when the weighing system is **tilted up to and including 5 % rise over run in any direction from a level position and rebalanced.** ~~**out of level up to three degrees or 5 %.**~~ If the accuracy of the system is affected by out-of-level conditions normal to the use of the device, the system shall be

equipped with an out-of-level sensor that inhibits the weighing operation when the system is out of level to the extent that the accuracy limits are exceeded.

(Added 1992) (**Amended 2008**)

**Background/Discussion:** The WWMA received a proposal from a manufacturer to amend paragraph S.2.4. to clearly state that the 5 % is referring to slope or grade based on flat plane (180 degrees). The submitter stated that existing language in HB 44 paragraph S.2.4. was confusing and that several individuals in the weighing industry have said that 5 % refers to 5 % of 90 degrees, which would make the approved angle 4.5 degrees. As a result, these manufacturers market their devices as being NTEP certified for 4.5 degrees out-of-level.

During its 2007 open hearings, the WWMA S&T Committee heard comments from the NTETC WS and a weights and measures consultant stating that they believe there is not a problem with existing language. However, additional comments from device manufacturers indicate confusion about the difference between the 5 % requirements and the parenthetical “approximately 3 degrees.” The NIST technical advisor noted the “degree” equivalent is used in international recommendations. One scale manufacturer, noting that the limits in HB 44 are not equivalent, stated that an NTEP CC had been issued stating the device complies with out-of level conditions at “5 %” or “3 degrees.”

To more clearly state the specification in NIST HB 44, and because 5 % does not correspond exactly with 3 degrees, the WWMA agreed to forward the proposal to NCWM S&T Committee as a Voting item.

At its 2007 Interim Meeting, the CWMA agreed that the language for “Level Indicating Means” could be clarified in HB 44 and agreed that the 5 % inferred a grade or slope and that the existing language did not explicitly state this. Additionally, the CWMA recommended that the phrase in parentheses “(approximately three degrees)” remain in paragraph S.2.4. as shown below. The CWMA further recommended this proposal, as revised by the CWMA, move forward as a Voting item on the NCWM S&T Committee Agenda.

At its 2007 Annual Meeting the SWMA heard support from one manufacturer for the proposal as submitted. Another manufacturer recommended removing the word “approximately” from the parentheses in the fourth line of S.2.4. The SWMA modified S.2.4. accordingly and recommended that the item move forward as a Voting item on the NCWM S&T Committee Agenda.

During the 2008 NCWM Interim Meeting, the Committee heard support for the intent of this item and comments recommending that the reference to “in any upright direction” not be deleted from paragraph S.2.4. and added to paragraph S.2.4.1. WMD commented that the language in HB 44 does not need clarification and that the problem has adequately been addressed by the NTETC WS in their recommendation to clarify the requirements and test procedures in Publication 14. WMD added that if the Committee believes that clarification in the referenced paragraphs is needed, then the SMA recommendation to delete references to “approximately three degrees” would be a reasonable alternative since it does not change the current requirements and is consistent with OIML R 76. The Committee agreed with the justification to clarify the current language in HB 44 and the suggestions from the SMA. Therefore, the Committee decided to present the amended proposal as shown in their Interim Report for a vote at the Annual Meeting.

At their 2008 spring meetings, the CWMA and NEWMA supported the item as originally recommended in the Committee’s Interim Report.

At the 2008 Annual Meeting, the Committee heard comments that the proposed language in Publication 16 was more confusing than the existing language in HB 44. The Committee reviewed a similar requirement from Measurement Canada during their deliberations on this item. Based on its review, the Committee amended the proposal as shown in the above recommendation and presented it for a vote.

**320-6 I S.2.1.6. Combined Zero-Tare (“0/T”) Key, S.2.3. Value of Tare Indication and Recorded Representations, S.2.4, Preset Tare Mechanism, Appendix D; Definitions for Tare Mechanism, Gross Weight Value, Net Weight, Net Weight Value, Tare, and Tare Weight Value**

**Source:** Carryover Item 320-9. (This item originated from the NTETC WS and first appeared on the Committee’s 2007 agenda.)

**Recommendation:** (NOTE: This item was considered jointly with item 324-2.) This recommendation clarifies the requirements for metrological tare (e.g., tare objects weighed or balanced off at the time of the transaction), tare accuracy, operating range, visibility, and preset tares (e.g., manually entered or stored tares for multiple transactions) as outlined in the recommendation below by:

1. Modifying the definition for “tare mechanism” and adding new definitions for “gross weight value,” “net weight,” “net weight value,” “tare,” “tare-balancing mechanism,” “tare-weighing mechanism,” “preset tare,” “preset tare mechanism,” and “tare weight value” to Appendix D.
2. Delete paragraph 2.1.6. and adding a new paragraph S.2.3.6.
3. Modifying paragraphs S.2.3. and S.2.3.1. and adding new paragraphs S.2.3.1.2. and S.2.3.1.3.; S.2.3.2. through S.2.3.8. and S.2.4. through S.2.4.1. to provide new requirements for tare accuracy, operating range, and visibility.

Amend the following definition for “tare mechanism:”

**tare mechanism.** A **tare-balancing and tare-weighing** 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 net indication to zero when the tare object is on the load-receiving element** (See also “preset tare,” “tare-weighing mechanism” and “tare-balancing mechanism”).

**Notes:**

1. **Reducing the weighing range for net loads is known as subtractive tare (e.g.,  $\text{Net Weight} + \text{Tare Weight} \leq \text{Gross Weight Capacity}$ ).**
2. **Increasing the weighing range for gross loads without altering the weighing range for net loads on mechanical scales is known as additive tare (e.g., a tare bar on a mechanical scale with a beam indicator where  $\text{Net Weight} + \text{Tare Weight} \geq \text{Gross Weight Capacity}$ ).**

**The tare mechanism may function as:**

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

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.

(Added 200X)

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 with a typical 10-key keyboard with values 0 through 9, by the pushing of a key numbered 5, the value 5 is entered as a tare value. For example, pressing the 0 then 5 key enters 0.05 as the tare value on a scale where  $d = 0.01$ .
- 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 lb x 0.01 lb scale, each time a specifically marked key is depressed, a tare is entered equal to 0.01 lb. If that key were depressed five times, the tare value would be equal to 0.05 lb.
- 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 relative to a range of gross weights (i.e., a 10 g tare for gross weights between 0 kg and 2 kg, a 20 g tare for gross weights between 2 kg and 4 kg, etc.). A proportional tare is, therefore, not limited to being a percentage tare.

[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-balancing mechanism. A tare mechanism with an indication that tare has been taken either semiautomatically or automatically 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. [2.20, 2.24]

(Added 200X)

**tare-weighing mechanism. A tare-balancing mechanism that stores the tare value that has been taken either semiautomatically or automatically and is capable of displaying (continuously or upon command) or printing the value whether or not the instrument is loaded. [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)**

Delete paragraph S.2.1.6. as follows (See proposed paragraph S.2.3.6.):

~~S.2.1.6. Combined Zero-Tare (“0/T”) Key. Scales not intended to be used in direct sales applications may be equipped with a combined zero and tare function key, provided that the device is clearly marked as to how the key functions. The device must also be clearly marked on or adjacent to the weight display with the statement “Not for Direct Sales.”~~

~~(Added 1998)~~

Amend paragraph S.2.3. and S.2.3.1. as follows:

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

~~S.2.3. Tare: *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-weighing and tare-balancing 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 and 200X)~~

*[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 (Division) and Capacity. On any scale (except a monorail scale equipped with digital indications and multi-interval scales when the value of tare is determined in a lower weighing segment), the value of the tare-weighing division shall be equal to the value of the scale division for any given load and shall not be operable above its maximum capacity.**

**[Nonretroactive as of January 1, 1983]**

**(Added 200X)**

~~**S.2.3.1.1. 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)~~

**S.2.3.1.2. Multi-interval Scales.** – **On multi-interval scales, the tare capacity is limited to the capacity of the first weighing segment and the value of the tare division shall be equal to the value of the scale division from the first weighing segment.**

**(Added 200X)**

**S.2.3.1.3. Multiple Range Scales.** – **On multiple range scales, the tare capacity may be operable in the greater weighing ranges if it is possible to switch to a greater weighing range**

with a load on the scale. The value of the tare division shall be equal to the value of the scale division from the weighing range where the tare was determined.

(Added 200X)

Add new paragraphs S.2.3.2. through S.2.3.8. as follows:

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

$\pm 0.25 d$  for electronic weighing devices and any weighing device with an analog indication, and

$\pm 0.5 d$  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  $d_1$  (division value of the first weighing segment).

(Added 200X)

S.2.3.3. Visibility of Operation. – Operation of the tare mechanism shall be visibly indicated on the instrument. In the case of instruments with digital indications, this shall be done by marking the indicated net value with the word “NET” or the symbol “N”. “NET” may be displayed as “NET”, “Net” or “net”. 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.

(Added 200X)

S.2.3.4. 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.

(Added 200X)

S.2.3.5. Semi-automatic or Automatic\* Tare-Balancing or Tare-Weighing Mechanisms. – These mechanisms shall be operable or accessible only by a tool outside of and separate from this mechanism or they shall be enclosed in a cabinet, or they shall be operable only when the indication is stable within:

(a)  $\pm 3$  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)  $\pm 1$  scale division for all other scales.

\* Automatic tare mechanisms are not permitted for direct sales to the public.

(Added 200X)

S.2.3.6. Combined Zero-setting and Tare-balancing Mechanisms (0/T Key). – Scales not intended to be used in direct sales to the public may be equipped with a combined zero and tare function key, provided 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:

(a) After zero/tare setting, the effect of accuracy of the zero setting shall be not more than  $\pm 0.25 d$ .

- (b) A “center-of-zero” condition shall either automatically be maintained to  $\pm 0.25$  scale division or less or have an auxiliary or supplemental “center-of-zero” indicator that defines a zero-balance condition to  $\pm 0.25$  scale division or less.
- (c) 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.
- (d) The scale must also be clearly marked on or adjacent to the weight display with the statement “Not for Direct Sales.”

(Added 200X)

S.2.3.7. Consecutive Tare Operations. – Repeated operation of a tare mechanism (including preset tare) is permitted for single transactions with one gross, one net, and multiple tare values. If more than one tare mechanism is operative at the same time, tare weight values shall be clearly designated (identified) with either “T” for tare or “PT” for preset tare as appropriate when indicated or printed.

(Added 200X)

S.2.3.8. Indication and Printing of Weighing Results.

- (a) Gross weight values may be printed without any designation or by using a complete word or symbol. For a designation by a symbol, only uppercase “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 using a complete word or symbol. The complete word “Net” or symbol “N” shall be used to designate a net weight as shown in S.2.3.3. Visibility of Operation. 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 be identified at least by the corresponding symbols “N” and “T” or by complete words using all upper-case letters, all lower-case letters, or a combination of upper- and lower-case letters.
- (e) If net weight values and tare values determined by different tare mechanisms are printed separately for single transactions with multiple gross, tare, and net values, they shall be suitably identified (e.g., vehicle sequentially loaded with mixed commodities).

(Added 200X)

Add new paragraphs S.2.4. and S.2.4.1. as follows:

S.2.4. Preset Tare Mechanism, Operation. – In addition to the provisions of paragraphs S.2.3. Tare and S.2.3.1. Scale Interval, a preset tare mechanism may be operated together with one or more tare devices provided:

- (a) the preset tare mechanism complies with paragraph S.2.3.7. Consecutive Tare Operations, and
- (b) the preset tare operation cannot be modified or cancelled as long as any tare mechanism operated after the preset tare operation is still in use,

- (c) the preset tare associated with a price look-up (PLU) shall be automatically cancelled at the same time a PLU is cancelled, and
- (d) the preset tare values are designated by the symbol “PT”; however, it is permitted to replace the symbol “PT” with complete words.

A 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).

(Added 200X)

S.2.4.1. Indication of Operation. – It shall be possible to temporarily indicate the preset tare value (e.g., pressing a tare display button or by indicating a negative net weight with no load on the load-receiving element). In addition to the provisions of paragraph S.2.3.8. Indication and Printing of Weighing Results, the calculated net value is printed and at least the preset tare value is printed, with the exception of:

- (a) a Class II or a Class III instrument with a maximum capacity not greater than 100 kg (200 lb) used in direct sales to the public,
- (b) price computing scales, and
- (c) nonautomatic weigh/price labeling scales.

(Added 200X)

**Background/Discussion:** This WS 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 WS 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 it has become increasingly difficult to base 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. Additionally, only a limited number of weights and measures officials, device manufacturers, and device owners and operators are regular participants in WS meetings where tare evaluation criteria are developed and discussed. 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 WS formed a Tare WG to review existing tare requirements and make recommendations as to how tare should operate on a single range scale, a multiple range scale, and a multi-interval scale. The WG was asked to develop, where necessary, recommendations for changes to Publication 14, HB 44, and HB 130 and to provide guidance to the WS on type evaluation requirements.

The WG developed proposals to amend HB 44 requirements to:

- a. ensure a tare feature operates in a manner that increases the accuracy of net weight determinations,
- b. state clearly 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 2007 Annual Meeting, the WS reviewed the final recommendation of the Tare WG and recommended that the NIST technical advisor submit a number of Tare WG recommendations to the weights and measures regional association and the NCWM S&T committees.

At that meeting, the WS stated that the Tare WG had completed its work. The Sector agreed that most of the proposed language is currently verified in Publication 14 with G-S.2. Facilitation of Fraud, S.2.1.6. Combined Zero/Tare (0/T) Key, and S.2.3 Tare listed as the HB 44 code references. The WG did not change any existing HB 44 tare requirements but recommended an amended definition for “tare mechanism.” The Sector agreed with the WG that the proposed items for calculated weights and the identification of preset tare weights go beyond what is currently evaluated by NTEP and recommended these items be split into separate proposals on the NCWM S&T agenda.

At their fall 2007 meetings, the WWMA and SWMA heard support from the NTETC WS and SMA to put forth the new NTETC WS version of the proposal. The WWMA agreed that the additional definitions would clarify tare-related terms. It also agreed that the Tare WG’s suggested changes would further harmonize NIST HB 44 with the latest version of R 76. Therefore, the WWMA and SWMA recommended the proposal, with the additions from the Tare WG, move forward as a Voting item on the NCWM S&T Committee Agenda.

At its 2007 Interim Meeting, the CWMA agreed that tare needs to be further defined in HB 44. The CWMA recommended the proposal be broken up into several parts in order to provide better clarification. The CWMA and NEWMA recommended this proposal be moved to Developmental until it can be divided into more manageable sections.

During the 2008 NCWM Interim Meeting, the Committee heard support for the intent of this item. In response to questions from the audience, the Committee clarified the term “additive tare” by providing an example of a mechanical scale with an ungraduated tare bar that does not reduce the net capacity of the scale. Additionally, the NIST Technical Advisor stated that the Tare WG did not believe that a definition for “additive tare” was needed since both subtractive tare and additive tare are described within the proposal to amend the definition of “tare mechanism.” The Committee considered the recommendations from the CWMA and NEWMA to split this item into more manageable sections. However, the Committee could not find a way to effectively split the proposal since the requirements in the proposal are interrelated.

During the Committee discussions on this item, the following clarifications for “consecutive tare operations” and “transactions using different tare mechanisms” were provided by Mettler Toledo.

**“Consecutive tare operations”** in proposed paragraph S.2.3.7. are described as a single transaction with one gross, one net, and multiple tare values. Examples include but are not limited to:

- (1) The sales of wrapped candy sold in bulk where a metrological tare (weighed) for a bag and a preset (percentage) tare for the candy wrappers are used to determine the net weight of the candy,
- (2) The loading of a vehicle with bins of products (where the preset tare weight for the bins were predetermined). If indicated and/or printed, the representation of tare would include the value of the metrological tare (T) and the summed values of the preset tare (PT).

**“Net weight values and tare values determined by different tare mechanisms”** in proposed paragraph 2.3.8.(e) includes single transactions with multiple gross, tare, and net determinations. For example, an unloaded vehicle would first be weighed to determine tare, loaded with a commodity, and reweighed to determine the gross weight and the net weight for that commodity. The vehicle would then be loaded with a different commodity and reweighed to determine a new gross weight. The second gross weight would be used to calculate the net weight of the second commodity by taking the difference between the second “tare” weight (gross weight of the first commodity) and the second gross weight (total weight of unloaded vehicle and both commodities).

Based on the clarifications, the Committee amended proposed paragraphs S.2.3.7. and S.2.3.8.(e) in this item. The Committee also moved the language from the originally proposed paragraph S.2.3. in its Interim Agenda to

paragraph S.2.3.1. to group together the language referring to scale intervals. The Committee also deleted the originally proposed subparagraphs S.2.3.9 (f) and (g) (Note: S.3.9. was renumbered to S.2.3.8. in the above proposal). Since the language for “calculated net weights,” was not fully developed or understood by the Committee, the Committee recommended that the subject of calculated net weights be submitted as a separate proposal for future consideration. Additionally, the Committee amended the proposed paragraph S.2.4.2. to remove requirements already stated in paragraph S.2.3.8. and deleted the “Note” since it addresses scales with a “0/T key” that are already marked with the statement “Not for Direct Sales” in the current HB 44 and the above proposed paragraph S.2.3.6.

At the 2008 Interim Meeting, the Committee did not receive any comments opposing this proposal and made this a Voting item in its Interim Report.

At their 2008 spring meetings, the SMA, the CWMA and NEWMA, opposed this as a Voting item and recommended that the item be made Informational to allow for further development and evaluation. The rationale for this position was that the proposal was significantly amended from the language in the recommendation appearing in the 2008 Interim Agenda and that there were some questions regarding some of the definitions and how they are to be applied.

The CWMA also recommended that this should be split into two sections and that the Weighing Sector should consider doing a practical review of the language using one or more devices.

NEWMA also recommend that this item be posted on the NCWM website and appropriate list servers along with a summary of how this item would appear in HB 44 if adopted.

The Committee agreed with the comments that this item needs additional time for review and analysis and that the item be given Information status. The Committee also recommends that the NIST technical advisor develop a 1-2 hour technical presentation on the proposed tare requirements that will be available to the regional weights and measures associations and the NTETC Weighing Sector and posted on the WMD and NCWM websites.

For additional background information, refer to the Committee’s 2007 Annual Report.

**320-7 I T.N.4.6. Time Dependence (Creep) for Load Cells During Type Evaluation and T.N.4.7. Creep Recovery for Load Cells During Type Evaluation**

**Source:** SMA Load Cell Manufacturers

**Background:** The Committee received a “priority” request to add a proposal as a Voting item to the Committee’s agenda. The request to add the item as a Voting item was not approved according to criteria in HB 44 Introduction Section H (c) Exceptions to Policy for Submission of Items to a Committee Agenda; Submission of Priority Items. However, the Committee agreed to discuss this item during the Annual Meeting. As a result of these discussions, the Committee added this item to its list of carryover items as an Information item and recommended that the NIST Technical Advisor work with the submitter of the item to develop a proposal to amend Table T.N.4.6. and add a table for designating loading and unloading times for consideration by the regional weights and measures associations.

**321 BELT-CONVEYOR SCALE SYSTEMS**

**321-1 V N.2.3. Minimum Test Load**

(This item was adopted.)

**Source:** Western Weights and Measures Association (WWMA)

**Proposal:** Amend NIST HB 44, Section 2.21. Belt Conveyor Scales (BCS) Systems Code, paragraph N.2.3. as follows:

**N.2.3. Minimum Test Load. – Except for applications where a normal weighment is less than 10 minutes,**  
~~¶~~The minimum test load shall not be less than the largest of the following values.

- (a) 800 scale divisions,
- (b) the load obtained at maximum flow rate in one revolution of the belt, or
- (c) at least 10 minutes of operation.

**For applications where a normal weighment is less than 10 minutes (e.g., belt-conveyor scale systems used exclusively to issue net weights for material conveyed by individual vehicles, and railway track cars) the minimum test load shall be the normal weighment that also complies with (a) and (b).**

The official with statutory authority may determine that a smaller minimum totalized load down to 2 % of the load totalized in 1 hour at the maximum flow rate may be used for subsequent tests, provided that:

1. the smaller minimum totalized load is greater than the quantities specified in (a) and (b), and
2. consecutive official testing with the minimum totalized loads described in N.2.3. (a), (b), or (c) and the smaller minimum test load has been conducted that demonstrates the system complies with applicable tolerances for repeatability, acceptance, and maintenance.

(Added 2004) **(Amended 2008)**

**Background/Discussion:** In 2004 NIST HB 44 paragraph N.2. Conditions of Test. was amended, and the minimum totalized load (MTL) requirements were amended and renumbered to N.2.3. Since 10 minutes of operation in N.3.2.(c) typically results in a test load larger than (a) or (b), the 10 minutes MTL is used for most BCS installations. Additionally, the words “or a normal weighment” were deleted from MTL requirements; the words were no longer needed since language was developed to allow a smaller material test load provided the scale demonstrated compliance with BCS tolerances with the MTL and the smaller test load.

As a result of deleting the words “or a normal weighment,” it has been reported that the revised MTL requirements are not suitable for BCS installations that issue individual weights for vehicles and railcars. This is due to limitations of the installation and uncertainties in determining the net weights of several vehicles or railcars to compare material test results of the 10 minutes MTL with the alternate test load of “2 % of the load totalized in 1 hour.”

The restoration of the words “or a normal weighment” allows operation of such BCS systems used exclusively to issue net weights for material conveyed by individual vehicles and railway track cars, provided the systems comply with tolerance and repeatability requirements. It should be noted that the 10-minute test could still be used on installations that do not need to start and stop product flow to continuously fill and issue a totalized weight for several vehicles or railcars (unit trains).

At its 2007 Annual Meeting, the WWMA heard comments from a BCS manufacturer in support of the proposal and, consequently, recommended this proposal move forward as a Voting item on the NCWM S&T Committee Agenda.

During the 2008 Interim Meeting, the Committee heard comments from Bill Ripka, Thermo Fisher Scientific, supporting the proposal. The Committee agreed to present the proposal for a vote at the Annual Meeting.

At its February 2008 meeting, the NW&SA WG on BCS reviewed the proceedings from the Committee’s 2008 Interim Report. This led to discussion regarding the comparison and alignment of the recommendation in the Interim Report to similar requirements in OIML R 50 – “Continuous totalizing automatic weighing instruments (belt weighers)” Section 2.5. Minimum Test Load. The WG believes the statement “at least 10 minutes of operation” should be removed and could be brought into alignment with OIML R 50 use of 2 % load in one hour at maximum

flow rate. Additionally, the test load listed in OIML R 50 must be understood as the minimum amount needed for a materials test and is based on the systems maximum flow rate. However, this recommendation was too large of a change to the proposal. Recognizing the urgency of the proposed language, the WG decided to submit their recommendation to align the MTL requirements with R 50 at a later time. The WG recommended changing the proposed language in paragraph N.2.3. to clarify that the minimum test load for applications when the normal weighment is less than 10 minutes still indicate at least 800 scale divisions or one belt revolution.

At its 2008 spring meeting, the CWMA S&T Committee supported the item as written in the Interim Report and recommended that the item move forward to a vote.

At the 2008 Annual Meeting, the Committee heard comments that the proposed language in the Interim Report appeared to indicate that BCS systems would issue weights for the individual vehicles or railway cars. The Committee agreed that the intent was for the belt-conveyor scale system to issue “net weights” for materials conveyed by vehicles and railway track cars. The Committee also agreed with the NW&SA WG recommendation to make the exception for applications for small normal weighments. Consequently, the Committee amended the proposal to read as shown in the recommendation above.

### 321-2 V UR.2.2.(n) Belt Alignment

(This item was adopted.)

**Source:** Carryover Item 321-1. (This item originated from the SWMA and first appeared on the Committee’s 2007 agenda.)

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

#### UR.2.2. Conveyor Installation

**(n) Belt Alignment.** – The belt shall not extend beyond the edge of the outermost roller of any carry side (top) roller in any area of the conveyor nor touch the conveyor structure on the return (bottom) side of the conveyor.

(Amended 1998 and 2008)

**Background/Discussion:** During the 2006 NCWM Interim Meeting, the Committee considered the recommendations from the NCWM review panel and the comments from industry regarding this proposal. 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 are 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 effects 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 was no mechanism available to monitor the belt’s tracking 24 hours a day, 7 days a week. Industry requested specifications for what constituted 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 was some clear indication that belt alignment could be tracked for maintenance and accuracy purposes.

During the 2007 NCWM Annual Meeting, the Committee heard testimony that a work group of the NW&SA was addressing this item. The NW&SA, in a letter dated July 31, 2007, submitted a recommendation to the Committee for consideration during the 2008 NCWM Interim Meeting.

In that letter, the NW&SA WG stated there was 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 used by the original submitter. The WG added that no practical devices were available to measure such lateral alignment changes and recommended the language added to the original proposal above be













































































































