

National Type Evaluation Program (NTEP) Weighing Sector DRAFT Agenda

August 27-28, 2013 / Albany, NY

INTRODUCTION

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

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

Suggested revisions are shown in **bold face print** by ~~striking out~~ information to be deleted and **underlining** information to be added. Requirements that are proposed to be nonretroactive are printed in ***bold faced italics***.

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Table B
Glossary of Acronyms and Terms

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

Details of All Items
(In order by Reference Key)

CARRY-OVER ITEMS

1. Recommended Changes to NCWM Publication 14 Based on Actions at the 2013 NCWM Annual Meeting

Source:

Mr. Harshman, National Institute of Standards and Technology (NIST) Technical Advisor, has provided the Sector with specific recommendations for incorporating test procedures and checklist language based upon actions of the 2013 NCWM Annual Meeting. The Sector is asked to briefly discuss each item and, if appropriate, provide general input on the technical aspects of the issues.

1.a. Item 320-1 S.6.4. Railway Track Scales and Appendix D – Definitions

Source:

2013 S&T Committee Final Report

Background / Discussion:

At the 2013 NCWM Annual Meeting, the NCWM voted to amend HB-44 Scales Code paragraph S.6.4. Railway Track Scales and to add a new definition for “weigh module” to Appendix D. The following changes, shown below in 1) and 2), were adopted:

1) Amend NIST Scales Code paragraph S.6.4. Railway Track Scales. as follows:

S.6.4. Railway Track Scales. – A railway track scale shall be marked with the maximum capacity of each section of the load-receiving element of the scale. Such marking shall be accurately and conspicuously presented on, or adjacent to, the identification or nomenclature plate that is attached to the indicating element of the scale. ~~The nominal capacity of a scale with more than two sections shall not exceed twice its rated section capacity. The nominal capacity of a two section scale shall not exceed its rated section capacity.*~~

The nominal capacity marking shall satisfy the following.

(a) For scales manufactured from January 1, 2002 through December 31, 2013:

(1) The nominal capacity of a scale with more than two sections shall not exceed twice its rated section capacity.

(2) The nominal capacity of a two section scale shall not exceed its rated section capacity.

(b) For scales manufactured on or after January 1, 2014, the nominal scale capacity shall not exceed the lesser of:

(1) The sum of the Weigh Module Capacities as shown in Table S.6.4.M. or Table S.6.4, or;

(2) Rated Sectional Capacity (RSC) multiplied by the Number of Sections (Ns) minus the Number of Dead Spaces (Nd) minus 0.5. As a formula this is stated as $RSC \times (Ns - Nd - 0.5)$; or

(3) 290 300 kg (640,000 lb).

*[*Nonretroactive as of January 1, 2002]*

(Amended 1988, 2001, ~~and 2002~~, and 2013)

Table S.6.4.M.	
Railway Track Scale – Weigh Module Capacity	
Weigh Module Length (m)	Weigh Module Capacity (kg)
<u>< 1.5</u>	<u>36 300</u>
<u>1.5 to < 3.0</u>	<u>72 600</u>
<u>3.0 to < 4.5</u>	<u>108 900</u>
<u>4.5 to < 7.0</u>	<u>145 100</u>
<u>7.0 to < 9.0</u>	<u>168 700</u>
<u>9.0 to < 10.5</u>	<u>192 300</u>
<u>10.5 to < 12.0</u>	<u>234 100</u>
<u>12.0 to < 17.0</u>	<u>257 600</u>
Note: The capacity of a particular module is based on its length and determined from corresponding capacity values specified in Table S.6.4.M.	

(Table Added 2013)

Table S.6.4.	
Railway Track Scale – Weigh Module Capacity	
Weigh Module Length (ft)	Weigh Module Capacity (lb)
<u><5</u>	<u>80 000</u>
<u>5 to < 10</u>	<u>160 000</u>
<u>10 to < 15</u>	<u>240 000</u>
<u>15 to < 23</u>	<u>320 000</u>
<u>23 to < 29</u>	<u>372 000</u>
<u>29 to < 35</u>	<u>424 000</u>
<u>35 to < 40</u>	<u>516 000</u>
<u>40 to < 56</u>	<u>568 000</u>
Note: The capacity of a particular module is based on its length and determined from corresponding capacity values specified in Table S.6.4.	

(Table Added 2013)

2) Add the following definition for the term “weigh module” to NIST Handbook 44, Appendix D:

weigh module - The portion of a load-receiving element supported by two sections. The length of a module is the distance to which load can be applied. [2.20]

See the Interim Report of the 2013 NCWM S&T Committee Agenda Item 320-1 for additional background information on the item to amend HB 44 Scales Code paragraph S.6.4. Railway Track Scales and add a new definition for “weigh module” to HB 44 Appendix D (http://www.ncwm.net/resources/dyn/files/1025938z8fff0401/fn/2013_ST_Pub16.pdf).

Recommendation:

The NIST Technical Advisor recommends that Publication 14 DES Section 1, Checklists and Test Procedures, be amended so that it corresponds with the changes to HB-44. The Sector is asked to consider the following changes:

DES Section 1. Marking - Applicable to Indicating, Weighing/Load-Receiving Elements and Complete Scales

Marking Nominal Capacity, Value of the Scale Division, Special Applications

Code References: S.6., S.6.6., Table S.6.3.a. and Table S.6.3.b.

For railway track scales manufactured from January 1, 2002 through December 31, 2013 and all livestock scales:

The nominal capacity of a scale with more than two sections shall not exceed twice its rated section capacity.

The nominal capacity of a two-section scale shall not exceed its rated section capacity.

For railway track scales manufactured on or after January 1, 2014, the nominal scale capacity shall not exceed the lesser of:

- (1) **The sum of the Weigh Module Capacities as shown in Table S.6.4.M. or Table S.6.4, or;**
- (2) **Rated Sectional Capacity (RSC) multiplied by the Number of Sections (Ns) minus the Number of Dead Spaces (Nd) minus 0.5. As a formula this is stated as RSC x (Ns - Nd - 0.5); or**
- (3) **290 300 kg (640,000 lb).**

Table S.6.4.M.	
Railway Track Scale – Weigh Module Capacity	
<u>Weigh Module Length (m)</u>	<u>Weigh Module Capacity (kg)</u>
<u>< 1.5</u>	<u>36 300</u>
<u>1.5 to < 3.0</u>	<u>72 600</u>
<u>3.0 to < 4.5</u>	<u>108 900</u>
<u>4.5 to < 7.0</u>	<u>145 100</u>
<u>7.0 to < 9.0</u>	<u>168 700</u>
<u>9.0 to < 10.5</u>	<u>192 300</u>
<u>10.5 to < 12.0</u>	<u>234 100</u>
<u>12.0 to < 17.0</u>	<u>257 600</u>
Note: The capacity of a particular module is based on its length and determined from corresponding capacity values specified in Table S.6.4.M.	

Table S.6.4.	
Railway Track Scale – Weigh Module Capacity	
<u>Weigh Module Length (ft)</u>	<u>Weigh Module Capacity (lb)</u>
<u><5</u>	<u>80 000</u>
<u>5 to < 10</u>	<u>160 000</u>
<u>10 to < 15</u>	<u>240 000</u>
<u>15 to < 23</u>	<u>320 000</u>
<u>23 to < 29</u>	<u>372 000</u>
<u>29 to < 35</u>	<u>424 000</u>
<u>35 to < 40</u>	<u>516 000</u>
<u>40 to < 56</u>	<u>568 000</u>
Note: The capacity of a particular module is based on its length and determined from corresponding capacity values specified in Table S.6.4.	

Devices designed for special applications ...

1.b. Item 320-4 Appendix C – Units of Mass (ton)

Source:

Mr. Paul Lewis, Rice Lake Weighing Systems, Inc. (2011 NTETC Weighing Sector Agenda Item 8 and 2012 Weighing Sector Agenda Item 5)

Background / Discussion:

At its 2013 Annual meeting, the NCWM voted in favor of amending Appendix C – General Tables of Units of Measurement to recognize “tn” as an acceptable abbreviation for “net” or “short” ton and to add a new footnote, where appropriate, to make clear that abbreviations for “net” or “short” ton other than “tn” are considered acceptable for use with older equipment. The following changes were adopted:

- 1) Amend the Units of Mass Table on pages C-19 and C-20 of NIST Handbook 44 Appendix C to recognize “tn” as an acceptable abbreviation for “net” or “short” ton, and add a footnote to the table to make clear that abbreviations for “net” or “short” ton other than “tn” are considered appropriate for use with older equipment as follows:

Units of Mass	
1 assay ton ¹⁷ (AT)	29.167 grams
1 carat (c)	200 milligrams (exactly) 3.086 grains
1 dram apothecaries (dr ap or ʒ)	60 grains (exactly) 3.888 grams
1 dram avoirdupois (dr avdp)	27 ¹¹ /32 (= 27.344) grains 1.772 grams
1 gamma (γ)	1 microgram (exactly)
1 grain	64.798 91 milligrams (exactly)
1 gram (g)	15.432 grains 0.035 ounce, avoirdupois
1 hundredweight, gross or long ¹⁸ (gross cwt)	112 pounds (exactly) 50.802 kilograms
1 hundredweight, gross or short (cwt or net cwt)	100 pounds (exactly) 45.359 kilograms
1 kilogram (kg)	2.205 pounds
1 milligram (mg)	0.015 grain
1 ounce, avoirdupois (oz avdp)	437.5 grains (exactly) 0.911 troy or apothecaries ounce 28.350 grams
1 ounce, troy or apothecaries (oz t or oz ap or ʒ)	480 grains (exactly) 1.097 avoirdupois ounces 31.103 grams
1 pennyweight (dwt)	1.555 grams
1 point	0.01 carat 2 milligrams
1 pound, avoirdupois (lb avdp)	7000 grains (exactly) 1.215 troy or apothecaries pounds 453.592 37 grams (exactly)
1 micropound (μlb) [the Greek letter mu in combination with the letters lb]	0.000 001 pound (exactly)

1 pound, troy or apothecaries (lb t or lb ap)	5760 grains (exactly) 0.823 avoirdupois pound 373.242 grams
1 scruple (s ap or ℥)	20 grains (exactly) 1.296 grams
1 ton, gross or long ¹⁹	2240 pounds (exactly) 1.12 net tons (exactly) 1.016 metric tons
1 ton, metric (t)	2204.623 pounds 0.984 gross ton 1.102 net tons
1 ton, net or short (tn) ^x	2000 pounds (exactly) 0.893 gross ton 0.907 metric ton

¹⁷ Used in assaying. The assay ton...¹⁸ The gross or long ton and hundredweight are used commercially in the United States to only a very limited extent, usually in restricted industrial fields. The units are the same as the British “ton” and “hundredweight.”

¹⁹ The gross or long ton...

^xAs of January 1, 2014, “tn” is the required abbreviation for short ton. Devices manufactured between January 1, 2008 and December 31, 2013 may use an abbreviation other than “tn” to specify short ton.

- Amend the abbreviation “t” for 1 ton (20 hundredweights) beneath the Avoirdupois Units of Mass heading on page C-6 of NIST Handbook 44 Appendix C to “tn” and add the same footnote as is being added to the Units of Mass table to again make clear that abbreviations for “net” or “short” ton other than “tn” are considered appropriate for use with older equipment as follows:

Avoirdupois Units of Mass⁶

[The “grain” is the same in avoirdupois, troy, and apothecaries units of mass.]

1 μlb	= 0.000 001 pound (lb)
27 ¹¹ / ₃₂ grains (gr)	= 1 dram (dr)
16 drams	= 1 ounce (oz)
	= 437½ grains
16 ounces	= 1 pound (lb)
	= 256 drams
	= 7000 grains
100 pounds	= 1 hundredweight (cwt) ⁷
20 hundredweights	= 1 ton (t) (tn) ^x
	= 2000 pounds ⁷

In “gross” or “long” measure, the following values are recognized:

112 pounds (lb)	= 1 gross or long hundredweight (cwt) ⁷
20 gross or long hundredweights	= 1 gross or long ton
	= 2240 pounds ⁷

⁶ When necessary to distinguish...

⁷ When the terms “hundredweight” and...

^xAs of January 1, 2014, “tn” is the required abbreviation for short ton. Devices manufactured between January 1, 2008 and December 31, 2013 may use an abbreviation other than “tn” to specify short ton.

Additional background information relating to this item is available from the following:

2012 NCWM Final Report: <http://www.ncwm.net/meetings/annual/archive>
 2012 Weighing Sector Summary (Agenda Item 5) : [Link to be added](#)
 2013 NCWM Interim Report at:
http://www.ncwm.net/resources/dyn/files/1025938z8fff0401/_fn/2013_ST_Pub16.pdf

Recommendation:

As a result of “tn” being adopted as an acceptable abbreviation for the “short” or “net” ton in NIST Handbook 44, the NIST Technical Advisor recommends that the Sector:

1) review the table of abbreviations appearing on page BCS-4 Section 1.8 of Publication 14 BCS and consider whether or not any changes are needed. The NIST Technical Advisor notes that the word “ton” and the abbreviation “T” are currently listed as acceptable abbreviations for the U.S. short ton in the table. It is suggested that the Sector consider replacing them with the abbreviation “tn” and add a statement to make clear that the word “ton” may also be used to identify the U.S. short ton as shown below under 1).

2) review the list of Acceptable Abbreviations/Symbols in the table appearing in NCWM Publication 14 DES Appendix C and determine if the suggested highlighted changes to the table (shown below under 2)) are appropriate and whether or not any additional changes are necessary.

- 1) Publication 14 BCS Section 1.8 (page BCS-4)

Code Reference: G.1.2., S.1.2., S.1.3.1.		<input type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> N/A
1.8. The scale division shall be in increments of 1, 2, or 5 times 10k where k is an integer and shall not be greater than 0.125 % (1/800) of the minimum totalized load.		
What is a scale division?		
Unit	Abbreviation	
pounds	lb or LB	
U.S. short ton	<u>ton tn or T (although not an abbreviation, the word “ton” is also used to reference the short or net ton</u>	
U.S. long ton	LT	
Metric ton	t	
kilograms	kg	

- 2) Publication 14 DES Appendix C Acceptable Abbreviations/Symbols

<p>Appendix C</p> <p>Acceptable Abbreviations/Symbols</p> <p>This list does not standardize the abbreviations/symbols that must be used, rather, it identifies abbreviations/symbols that are routinely acceptable. This list is not limiting or all-inclusive; other abbreviations/symbols may be acceptable.</p> <p>Additionally, the following lists of abbreviations and symbols should be used as a guide; style differences are acceptable (e.g. shapes of arrows,)</p>

Device Application	Term	Acceptable	<u>NOT</u> Acceptable
General	value of scale division (displayed)	d	
	value of verification scale division	e	
	number of scale divisions	n	
	gross	gross, G, GR	
	Semi-automatic (push-button) tare	tare, T, TA	
	Keyboard, Programmable and Stored tare	tare, T, TA, PT	
	net	net, N, NT	
	pieces	pieces pc, pcs	
	count	count cnt or pc(s) <i>is encouraged or ct symbol for pieces ct is acceptable NIST Handbook 130</i>	c
	carat or carat troy – 200 mg	c <i>NIST Handbook 44 and NIST Guide for the Use of International System of Units (SI)</i>	ct <i>not permitted if used as the abbreviation for carat and count on a scale with an enable count feature</i>
Values Defined	SI Units <i>Notes: Lower case "kg" on display panels and keys. Lower case "kg" shall be used for printing.</i>	<i>NIST Guide for the Use of International System of Units (SI)</i>	upper case "KG"
	Other Symbols	<i>NIST Handbook 44 Appendix C – General Tables of Units of Measurement</i>	
*Exceptions to General Tables of NIST Handbook 44	carat or carat troy – 200 mg	ct <i>common jewelry industry abbreviation and is the only acceptable abbreviation in Canada</i>	ct <i>not permitted if used as the abbreviation for carat and count on a scale with an enable count feature</i>
	U.S. short ton [†]	ton, TN or tn note: for belt-conveyor scales manufactured prior to January 1, 2014, the abbreviation "T" is acceptable	
	U.S. long ton	LT	
	Grain	grain, GRN, grn, GN	
Weighing and Indicating Elements	accuracy class	I, II, III, III L, IIII or symbols enclosed in an ellipse such as:Ⓢ	1, 11, 111, 111 L, 1111, 1, 2, 3 L, 4
	maximum number of scale divisions	n _{max}	N
	section capacity	Sec C, Sec Cap	SC
Weighing/Load Receiving Elements	minimum value of verification scale division	e _{min}	E

Load Cells	maximum number of scale divisions	n_{max}	N
	single or multiple cell applications	S = Single M = Multiple	
	load cell verification interval	v_{min}	V
ECRs, Indicating and Recording Elements	manual weight entry	Manual weight, MAN, WT, MANUAL WT, MAN WEIGHT, similar statement	"M" or "MW"
	symbols for kilogram	Same as noted in Section 11. Values Defined	<i>mixed upper and lower case letters are not permitted</i>
ECRs, Recorded Representations	net weight indication in pounds	"pound" or "lb"	"#" symbol for pound
Livestock and Animal Scales	Head (sale by)	HB, H	
	Weight (sale by)	WT, W	
	other symbols recognized by the Packers and Stockyards Administration		
Prescription Filling Count Feature for Class I and II Scales	minimum piece weight	MPW	
	minimum sample size	MSS	
	minimum sample size in weight	MSSW	
Belt-Conveyor Scales	U.S. short ton (different from "General" application)	T <i>(except as noted in footnote 1 of this table)</i>	
<i>As of January 1, 2014, "tn" is the required abbreviation for short ton. Devices manufactured prior to January 1, 2014 may use an abbreviation other than "tn" to specify short ton.</i>			

Technical advisors note: A global search of the abbreviations listed in all Publication 14 documents associated with weighing devices should be performed to determine if additional changes are needed as a result of "tn" being adopted as an acceptable abbreviation for the "short" or "net" ton.

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

Sources:

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

Background / Discussion:

Local weights and measures inspectors need a means to determine whether equipment discovered in the field has been evaluated by NTEP. If so, the inspector needs to know at a minimum the CC number. From this starting point,

other required information can be ascertained. *NIST Handbook 44* currently includes three options for marking of the CC:

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

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

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

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

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

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

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

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

NIST Handbook 44 – Proposed changes:

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

- (a) the name, initials, or trademark of the manufacturer or distributor;
- (b) a model identifier that positively identifies the pattern or design of the device;

(1) The model identifier shall be prefaced by the word "Model," "Type," or "Pattern." These terms may be followed by the word "Number" or an abbreviation of that word. The abbreviation for the word "Number" shall, as a minimum, begin with the letter "N" (e.g., No or No.). The abbreviation for the word "Model" shall be "Mod" or "Mod." Prefix lettering may be initial capitals, all capitals, or all lowercase.

[Nonretroactive as of January 1, 2003]

(Added 2000) (Amended 2001)

- (c) a nonrepetitive serial number, except for equipment with no moving or electronic component parts and ~~not built for purpose software-based software devices~~ software;
[Nonretroactive as of January 1, 1968]
(Amended 2003)
- (1) *The serial number shall be prefaced by words, an abbreviation, or a symbol, that clearly identifies the number as the required serial number.*
[Nonretroactive as of January 1, 1986]
- (2) *Abbreviations for the word "Serial" shall, as a minimum, begin with the letter "S," and abbreviations for the word "Number" shall, as a minimum, begin with the letter "N" (e.g., S/N, SN, Ser. No., and S. No.).*
[Nonretroactive as of January 1, 2001]
- (d) the current software version or revision identifier ~~for not built for purpose software-based electronic devices~~, which shall be directly linked to the software itself;
[Nonretroactive as of January 1, 2004]
(Added 2003) (~~Amended 20XX~~)
- (1) *The version or revision identifier shall be prefaced by words, an abbreviation, or a symbol, that clearly identifies the number as the required version or revision.*
[Nonretroactive as of January 1, 2007]
(Added 2006)
- (2) *Abbreviations for the word "Version" shall, as a minimum, begin with the letter "V" and may be followed by the word "Number." Abbreviations for the word "Revision" shall, as a minimum, begin with the letter "R" and may be followed by the word "Number." The abbreviation for the word "Number" shall, as a minimum, begin with the letter "N" (e.g., No or No.).*
[Nonretroactive as of January 1, 2007]
(Added 2006)
- (3) *The version or revision identifier shall be accessible via the display. Instructions for displaying the version or revision identifier shall be described in the CC. As an exception, permanently marking the version or revision identifier shall be acceptable under the following conditions:*
- (a) *The user interface does not have any control capability to activate the indication of the version or revision identifier on the display, or the display does not technically allow the version or revision identifier to be shown (analog indicating device or electromechanical counter) or*
- (b) *the device does not have an interface to communicate the version or revision identifier.*
- (e) an NTEP CC number or a corresponding CC Addendum Number for devices that have a CC.
- (1) *The CC Number or a corresponding CC Addendum Number shall be prefaced by the terms "NTEP CC," "CC," or "Approval." These terms may be followed by the word "Number" or an abbreviation of that word. The abbreviation for the word "Number" shall, as a minimum, begin with the letter "N" (e.g., No or No.).*
[Nonretroactive as of January 1, 2003]

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

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

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

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

(b) The CC Number shall be:

(1) permanently marked on the device;

(2) continuously displayed; or

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

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

[Nonretroactive as of January 1, 2004]

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

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

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

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

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

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

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

To move this forward, someone should address the regional groups. There are 5 – 6 potential venues for presentations. The last slide from the current presentation should be eliminated, to avoid confusing matters, for the

time being. The two regional meetings in the fall (Western and Southern) and the interim meeting are probably more critical than the ones in May. Dr. Thompson was asked to relay that we have a presentation available and would like to push our proposal as a voting item in 2014. To be part of the January 2014 Annual S&T committee's hearings / agenda, this needs to be brought to Rick Harshman's attention. Dr. Thompson volunteered to speak with him.

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

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

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

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

Discussion / Recommendation:

It is recommended that the Sector review the updated summary provided by the chairman of the 2013 Software Sector and consider providing additional guidance as necessary.

3. DES Section 70. - Performance and Permanence Tests for Railway Track Scales Used to Weigh In-Motion

NIST Technical Advisor's note: This item was to be removed from the Sector's agenda if no test data was received by the time that the 2013 WS agenda was being developed. No test data has been received; however, the item is being retained on the agenda because, according to Mr. Truex, NTEP Director, there remains an open NTEP application for the device and testing may still be ongoing.

Source:

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

Background / Discussion:

During the 2011 NTEP Weighing Sector Meeting, the Sector discussed a weigh in-motion system using new technology that utilizes continuous rails (no "rail gaps") on the approaches and weighing areas of the scale. The submitter stated that the manufacturer is currently unable to offer this device for sale in the U.S. in commercial applications because current NTEP type evaluation criteria and *NIST Handbook 44* requirements are written in such a way that makes it impossible for devices incorporating this new technology to comply. For example, *NIST Handbook 44* Scales Code paragraph UR.2.4. Foundations, Supports, and Clearance requires clearance be provided around all live parts to the extent that no contacts may result. *NCWM Publication 14*, DES Section 70, Inspect the Scale, Item 4 Rail Gaps states that "the rail gaps should be set at 3/8 inch." The *AAR Scale Handbook* includes language that allows 1/8 inch to 5/8 inch rail gaps.

The members of the Sector agreed that they were not willing to recommend deleting references to the required gaps in the rail until it is proven that the new technology complies with the tolerances in *NIST Handbook 44*. Thus, the Sector recommended that the applicant move forward with performance testing to confirm that the new technology complies with the tolerances in *NIST Handbook 44*. The Sector agreed that data resulting from the performance testing needs to be submitted to the Sector prior to the time that the 2012 NTETC Weighing Sector Agenda is developed or the item should not be included as a carryover item on that agenda.

Recommendation:

No action is being recommended at this time. Mr. Truex, NTEP Administrator, or Mr. Luthy, Stock Equipment Co., Inc., may wish to update the Sector, to the extent possible, on the progress of the performance testing.

4. NCWM Publication 14 Load Cell Table 6 – Summary Table Examples

Source:

NTEP Administrator (2012 Weighing Sector Agenda Item 7)

Background / Discussion:

The NTEP Administrator was contacted by an individual questioning tolerance values for repeatability and creep shown in the example summary table in *NCWM Publication 14 – Load Cells Table 6* “Example of a Summary Table for a Class III 3000 Single Load Cell” (the reported errors are shown in Table 6 in shaded text). The individual reported that:

1. The tolerance listed on the table should be the value from Table 3 - Tolerance for Class III Load Cells, page LC-10. That is, the repeatability error of a Class III 3000 single cell requirement (from Table 3) should be 0.7v (0-500v); 1.4v (501-2000v); 2.1v (2001-4000v); 3.5v (4001-10 000v), so the value of repeatability error shown on Table 6 should be other than 0.35v.
2. Similar error on Creep (time dependence) of Table 6, the value should follow the mpe Table T.N.4.6., the value of creep shown on Table 6 should be 1.05v other than 1.5v.
3. Same error on Creep change ($I_{20min} - I_{30min}$) of Table 6, according to Table T.N.4.6., it should be 0.1575v (0.15 x mpe) other than 0.225v.

Table 6 - 2012 NTEP Publication 14 Load Cell Values (Page LC-17)

Summary Table (As requested in Item 12 of the load cell data format paper)				
a.		Critical Result ⁴	Tolerance ⁵	Result/Tolerance
	Load Cell Error	0.68 v	0.7 v	0.97
b.	Repeatability Error	0.19 v	0.35 v	0.55
c.	Temperature Effect on MDLO	0.57 v _{min} /5 °C	0.7 v _{min} /5 °C	0.82
d.	Creep (time dependence)	0.98 v	1.5 v	0.65
e.	Δ Creep = $I_{20\ min} - I_{30\ min}$	0.09 v	0.15 x mpe = 0.225 v	0.40
f.	Creep Recovery	0.17 v	0.5 v	0.34
g.	Effect of Barometric Pressure	0.185 v _{min} /kPa	1.0 v _{min} /kPa	0.15

Table 3.

Tolerance for Class III Load Cells

<i>NIST Handbook 44</i> Reference	Single Cell Requirement		Multiple Cell Requirement	
Load Cell Error Table 6., Class III; T.N.3.2. and T.N.8.1.1.	0.7 Factor Applied		1.0 Factor Applied	
	Load	Tolerance	Load	Tolerance
	0 – 500v	0.35v	0 – 500v	0.50v
	501 – 2000v	0.70v	501 – 2000v	1.00v
	2001 – 4000v	1.05v	2001 – 4000v	1.50v
	4001 – 10 000v	1.75v	4001 – 10 000v	2.50v
Repeatability Error;	0.7 Factor Applied		1.0 Factor Applied	

T.N.5. and T.N.8.1.1.	Load	Tolerance	Load	Tolerance
	0 – 500v	0.70v	0 – 500v	1.00v
	501 – 2000v	1.40v	501 – 2000v	2.00v
	2001 – 4000v	2.10v	2001 – 4000v	3.00v
	4001 – 10 000v	3.50v	4001 – 10 000v	5.00v
Temperature Effect on Minimum Dead Load Output; T.N.8.1.3. and T.N.8.1.1.	0.7 v _{min} /5 °C		0.7 v _{min} /5 °C	
Effects of Barometric Pressure; T.N.8.2.	Applicable only to specified load cells 1 v _{min} /1kPa		Applicable only to specified load cells 1 v _{min} /1kPa	

At the 2012 WS meeting, the Sector was asked to review the information provided by Mr. Truex, NTEP Administrator, and agree on an appropriate recommendation to address the reported inaccuracies in *NCWM Publication 14 Load Cells Table 6 - Example of a Summary Table for a Class III 3000 Single Load Cell* (e.g., correcting or deleting Table 6, or other possible solutions).

During the 2012 WS meeting, members of the WS reviewed the values in NCWM Pub 14 Load Cell Table 6 and could not determine how some of the values were determined or derived. Consequently, the WS agreed to maintain the item as a Carryover item on their 2013 agenda to allow time for review and input from load cell experts. A small group of participants at the meeting volunteered to consult with load cell experts in an effort to verify accuracy and make corrections to the values in the table where needed.

Shortly after the 2012 WS meeting had concluded, Mr. Kevin Chesnutwood, NIST Quantum Measurement Division, provided a review of the values in the table and proposed changes where necessary. Because of how quickly this work was completed, it was decided that if everyone in attendance at the WS meeting agreed to the proposed changes, there was still enough time that a corrected version of the table could be submitted to the NTEP Committee for consideration. Should the NTEP Committee approve the corrected version, that table could be added to the 2013 version of Publication 14 Load Cells as replacement for the existing table. For this reason, the corrected version of the table was circulated to all participants at the 2012 WS meeting and members were asked to vote on whether or not to replace the existing table in Publication 14 with the version that had been corrected by Mr. Chesnutwood as follows:

Table 6 Corrected Version NTEP Pub 14 Load Cell Values (Page LC-17)

Summary Table (As requested in Item 12 of the load cell data format paper)				
		Critical Result ⁴	Tolerance ⁵	Result/Tolerance
a.	Load Cell Error	0.68 v	0.7 v	0.97
b.	Repeatability Error	0.19 v	0.35 v 0.7 v	0.55 0.27
c.	Temperature Effect on MDLO	0.57 v _{min} /5 °C	0.7 v _{min} /5 °C	0.82
d.	Creep (time dependence)	0.98 v	1.5 v 1.05 v	0.65 0.93
e.	Δ Creep = I _{20 min} – I _{30 min}	0.09 v	0.15 x mpe = 0.225 v 0.1575 v	0.40 0.57
f.	Creep Recovery	0.17 v	0.5 v	0.34
g.	Effect of Barometric Pressure	0.185 v _{min} /kPa	1.0 v _{min} /kPa	0.15

⁴The critical test result is the test result that gives the greatest ratio of result to tolerance. There may be other errors of greater absolute value but that give smaller ratios of result to tolerance.

⁵The tolerance is the value from the tolerance table of the NTEP procedure that corresponds to the critical test result.

Members voted unanimously in favor of approving the corrected version of the table, however, there were three participants at the WS meeting, representing load cell manufacturers, who, for whatever reason, did not vote. Because those three participants represented the majority of the load cell manufacturers present at the 2012 meeting, it was decided that the Sector recommend to the NTEP Committee that changes be made to the table, but that the item also remain as a Carry Over item on the 2013 WS agenda. One voting participant also offered the following comments:

1. The column marked as Results/Tolerance would be clearer if it was marked as Results , Tolerance
2. Foot notes 2 & 3 in Table 6 of Pub 14, 2011 Edition are the same as foot notes 4 & 5 (foot note 2 is the same as foot note 4 and foot note 3 is the same as foot note 5)

The NTEP Committee accepted all proposed changes to the table and a corrected version of the table was added to 2013 Publication 14 Load Cells to replace the previous existing table. The following two summary tables, the lower of which reflects the changes recommended by Mr. Chesnutwood and approved by 2012 NTEP Committee, appear beneath the title "Table 6" on page LC-17 of 2013 Publication 14 Load Cells:

Table 6.
Example of a Summary Table for a Class III 3000 Single Load Cell

Summary Table (As requested in Item 12 of the load cell data format paper)			
	Critical Result ²	Tolerance ³	Result/Tolerance
Load Cell Error	0.68 v	0.7 v	0.97
Repeatability Error	0.19 v	0.35 v	0.55
Temperature Effect on MDLO	0.57 v _{min} /5 °C	0.7 v _{min} /5 °C	0.82
Creep (time dependence)	0.98 v	1.5 v	0.65
Effect of Barometric Pressure	0.185 v _{min} /kPa	1.0 v _{min} /kPa	0.15

Summary Table (As requested in Item 12 of the load cell data format paper)				
		Critical Result ⁴	Tolerance ⁵	Result/Tolerance
a.	Load Cell Error	0.68 v	0.7 v	0.97
b.	Repeatability Error	0.19 v	0.7 v	0.27
c.	Temperature Effect on MDLO	0.57 v _{min} /5 °C	0.7 v _{min} /5 °C	0.82
d.	Creep (time dependence)	0.98 v	1.05 v	0.93
e.	Δ Creep = I _{20 min} - I _{30 min}	0.09 v	0.15 x mpe = 0.1575 v	0.57
f.	Creep Recovery	0.17 v	0.5 v	0.34
g.	Effect of Barometric Pressure	0.185 v _{min} /kPa	1.0 v _{min} /kPa	0.15

²The critical test result is the test result that gives the greatest ratio of result to tolerance. There may be other errors of greater absolute value but that give smaller ratios of result to tolerance.

³The tolerance is the value from the tolerance table of the NTEP procedure that corresponds to the critical test result.

⁴The critical test result is the test result that gives the greatest ratio of result to tolerance. There may be other errors of greater absolute value but that give smaller ratios of result to tolerance.

⁵The tolerance is the value from the tolerance table of the NTEP procedure that corresponds to the critical test result.

Recommendation:

The Sector is asked to review the values (some of which were corrected in 2012) in the lower of the two tables shown above, compare those values to the values in the upper table to determine if any changes to the values in either table are needed. The Sector is also asked to consider whether or not the upper table is needed. The NIST Technical advisor notes that the two summary tables seem to document the results of the same tests and aside from some of the values in the upper table appearing to be incorrect, the only difference in the two tables is that the upper table does not include a row to record entries for: 1) the change in indications for creep tests; or 2) creep recovery. The letters a. through g. in the lower table are defined on page LC-16 (i.e., the preceding page to the page containing the two summary tables shown). If it is decided that the upper table isn't needed and the Sector elects to recommend that it be deleted from future editions of NCWM Publication 14, it will also be necessary to amend the footnote numbers in the lower table to reflect the change. If it is decided that both summary tables are to remain in Publication 14, the NIST Technical Advisor recommends changing the footnote references "4" and "5" in the lower table to "2" and "3," respectively, and deleting the footnote text for footnotes 4 and 5, since the text for footnotes 4 and 5 is the same as that indicated in footnotes 2 and 3.

NEW ITEMS

5. Item 360-7 NIST Handbook 44 Appendix D – Definitions: Remote Configuration Capability

Source

2013 NCWM S&T Committee (2012 Grain Analyzer Sector Meeting Summary)

Background / Discussion:

At the 2012 Grain Analyzer Sector meeting, the Sector agreed to forward a proposal to amend the definition of "remote configuration capability" in NIST Handbook 44 to the S&T Committee for consideration. The following changes were proposed:

remote configuration capability. – The ability to adjust a weighing or measuring device or change its sealable parameters from or through some other device that ~~is not~~ **may or may not** itself **be** necessary to the operation of the weighing or measuring device or ~~is not~~ **may or may not be** a permanent part of that device.[2.20, 2.21, 2.24, 3.30, 3.37, 5.56(a)]

(Added 1993, **Amended 20XX**)

The Sector noted in their proposal that removable digital storage devices containing the latest grain calibrations can be used in grain moisture meters (GMMs) as either data transfer devices that are not necessary to the operation of the GMM or as data storage devices which are necessary to the operation of the GMM. If removable data storage devices are necessary to the operation of the device, they are not covered by the current definition of remote configuration capability.

A USB flash drive is most likely to be used as a data transfer device. In a typical data transfer application, the USB flash drive is first connected to a computer with access to the GMM manufacturer's web site to download the latest grain calibrations that are then stored in the USB flash drive. The USB flash drive is removed from the computer and plugged into a USB port on the GMM. The GMM is put into remote configuration mode to copy the new grain calibration data into the GMM's internal memory. When the GMM has been returned to normal operating (measuring) mode the USB flash drive can be removed from the GMM.

Although a Secure Digital (SD) memory card could also be used as a data transfer device it is more likely to be used as a data storage device. In a typical "data storage device" application, the SD memory card stores the grain calibrations used on the GMM. The SD memory card must be plugged into an SD memory card connector on a

GMM circuit card for the GMM to operate in measuring mode. To install new grain calibrations the GMM must be turned “off” or put into a mode in which the SD memory card can be safely removed. The SD memory card can either be replaced with an SD memory card that has been programmed with the new grain calibrations or the original SD memory card can be re-programmed with the new grain calibrations in much the same way as that described in the preceding paragraph to copy new grain calibrations into a USB flash drive. In either case, the SD memory card containing the new calibrations must be installed in the GMM for the GMM to operate in measuring mode. In that regard, the SD memory card (although removable) can be considered a permanent part of the GMM in that the GMM cannot operate without it.

Note: In the above example SD memory card could be any removable flash memory card such as the Secure Digital Standard-Capacity, the Secure Digital High-Capacity, the Secure Digital Extended-Capacity, and the Secure Digital Input/Output, which combines input/output functions with data storage. These come in three form factors: the original size, the mini size, and the micro size. A Memory Stick is a removable flash memory card format, launched by Sony in 1998, and is also used in general to describe the whole family of Memory Sticks. In addition to the original Memory Stick, this family includes the Memory Stick PRO, the Memory Stick Duo, the Memory Stick PRO Duo, the Memory Stick Micro, and the Memory Stick PRO-HG.

During its Open Hearings at the 2013 NCWM Interim Meeting, the Committee heard comments from Ms. Juana Williams (NIST OWM). OWM suggested the Committee consider this item as a Developing item to allow other Sectors to discuss how a change to the definition may affect other device types of similar design and to consider changes if needed. OWM recognizes that the current definition for “remote configuration capability” may not address those grain moisture meters (GMMs) which can only be operated with a removable data storage device, containing, among other things, the grain calibrations intended for use with the GMM, inserted in the device (as was described by the Grain Analyzer Sector). As such, OWM noted that current sealing requirements were developed at a time when such technology likely didn’t exist, nor could be envisioned, and are based on the current definition of remote configuration capability. Because the current definition was never intended to apply to this “next generation” technology, OWM suggested that those charged with further development of this item may wish to revisit the five philosophies of sealing and consider whether a new paragraph, completely separate from current sealing requirements, might be appropriate and a better option, than the one currently proposed. The five philosophies of sealing are included in the 1992 Report of the 77th National Conference on Weights and Measures (Report of the Specifications and Tolerances Committee). Another option, preferred over the changes currently proposed, would be to add a separate statement to the current definition of “remote configuration capability” to address removable storage devices. For example, the following sentence might be considered as an addition to the current definition for “remote configuration capability:”

Devices which are programmed using removable media (such as SD cards, flash drives, etc.) that may or may not be required to remain with the device during normal operation are also considered to be remotely configured devices.

The Committee also heard comments from Dmitri Karimov (LC), speaking on behalf of the MMA, who made two points: (1) Flow computers may already have these capabilities, thus it may be more appropriate to consider adding requirements to the General Code so that the requirements will be uniformly applied to all device types; and (2) the Committee should look ahead and consider other capabilities that may or already have emerged such as wireless communication and configuration.

The Committee acknowledged the comments indicating that the current definition of “remote configuration capability” was developed at a time when certain technologies, such as blue tooth, SD storage devices, flash drives, etc., didn’t exist. The Committee recognized that it may be difficult to modify the existing definition and associated requirements to be flexible enough to address emerging and future technologies without having a significant (and possibly detrimental impact) on existing devices. Consequently, rather than modifying the current definition, the Committee concluded that a better approach might be to develop an entirely separate set of security requirements that would apply to emerging technologies. The Committee believes that additional work is needed to develop proposed definition(s) and associated requirements and decided to designate the item as Developmental. The Committee requests other Sectors review the Grain Sector’s proposed modification to the definition as well as OWM’s suggestions and provide input.

During the 2013 NTEP Laboratory Meeting, the NTEP evaluators were asked if they were aware of or had observed during any of their evaluations of a weighing or measuring device, one which required some form of memory card or data storage device be installed in order for the device to be operational in the measuring or weighing mode. A weighing representative from Measurement Canada reported that he had observed scales having flash drives (some of which were micro in size) that are sealed via physical seal that contain calibration information and possibly even the operating system stored on a card, which must remain in the device in order for the device to be operational. The US NTEP evaluators (i.e., on both the weighing and measuring side) reported they had no knowledge of such technology being used in devices they had evaluated, but they also acknowledged that it could have been present without them noticing it during the evaluation process.

At the 2013 NCWM Annual meeting, OWM reiterated comments it made at the 2013 Interim meeting suggesting that it may be appropriate to develop separate requirements to address new and future technologies which can be remotely configured with removable media. OWM indicated it plans to develop draft language and request input from the various sectors at their upcoming meetings. Two additional comments were made in support of possibly including requirements in the General Code of NIST Handbook 44 to address newer and emerging technologies.

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

Recommendation:

The Sector is asked to identify the various types of removable storage media (e.g., USB flash drives, SD memory cards, etc.) currently in use with weighing equipment and explain the functionality of that media. OWM anticipates possibly using the information provided by the Sector to develop some draft proposals to amend NIST Handbook 44 to adequately address the security of the metrological significant parameters of devices using such media. Members of the Sector may wish to review NCWM Publication 14 DES Appendix B Requirements for Metrological Audit Trails prior to the Sector meeting to refresh their understanding of the various acceptable means of providing security.

6. NCWM Publication 14 DES Section 76 Digital Controller Element for Load Cells Checklists and Test Procedures

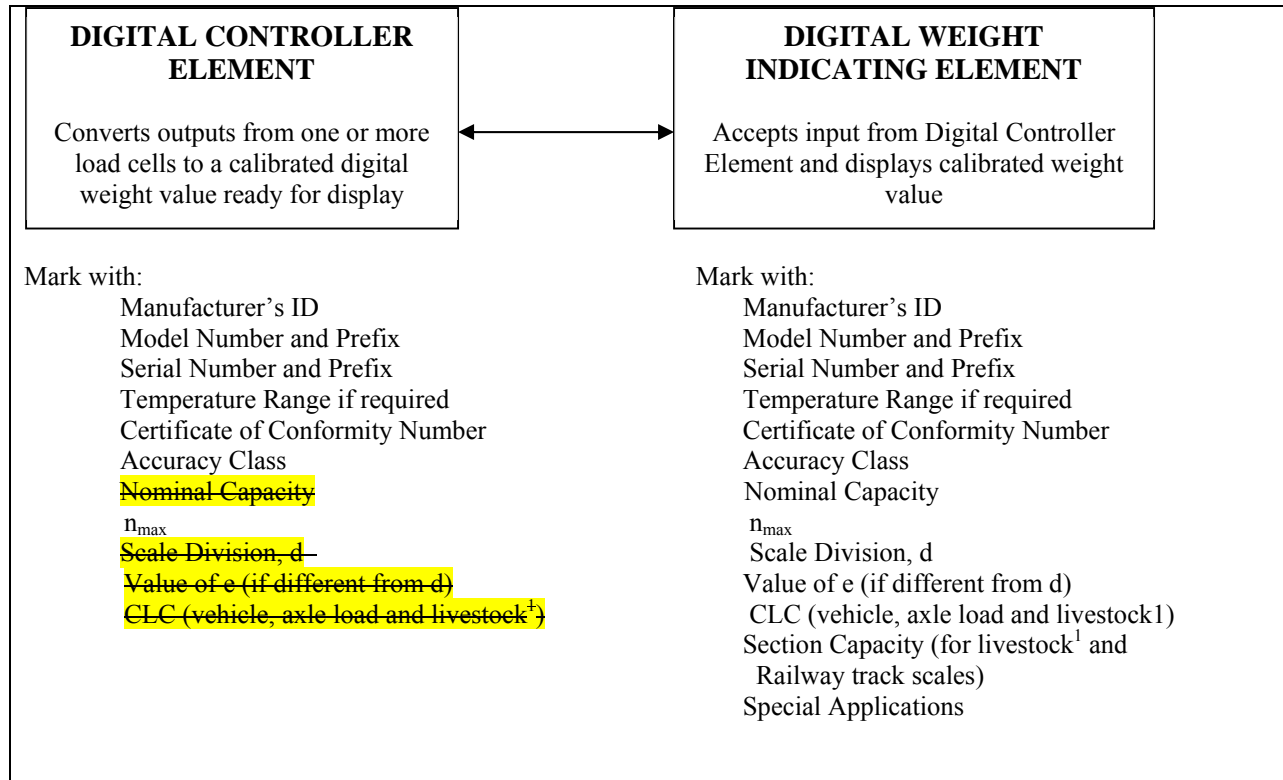
Source

NTEP Weighing Labs (2013 NTEP Lab Meeting)

Background / Discussion:

Section 76 Digital Controller Element for Load Cells Checklists and Test Procedures was first added to NCWM Publication 14 DES in 2013. During a review of the new checklists and test procedures at the April 2013 NTEP Lab Meeting, NTEP weighing evaluators questioned whether or not the nominal capacity, scale division d , value of e (if different than d), and CLC should be required marking on a Digital Controller Element that does not output a calibrated weight value as specified on page DES-134 of 2013 Publication DES. The evaluators noted that values corresponding to such marking on a DCE would likely vary depending upon other components used to create the scale system, e.g., the weighing/load-receiving element, load cells, etc., in which a DCE is but one part. For this reason, the evaluators don't believe this information should necessarily be required on a DCE and requested that the NIST Technical Advisor include a new item on the 2013 WS agenda to determine if the WS shared their view.

<p>Marking Requirements for DCEs that Do Not Output a Calibrated Weight Values</p>



Recommendation:

The Sector is asked to review the required marking information shown above for DCEs that do not output calibrated weight values, and determine whether or not the marking information struck out and highlighted is necessary.

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

Source:

NTEP Labs

Background / Discussion:

A “Note” in Section 1 of the Checklists and Procedures of NCWM Publication 14 Digital Electronic Scales specifies that for consistency purposes the NTEP labs use an Eberhard Faber ink eraser type #110 to verify the permanence of the lettering used to mark required information on a device. It has been reported that this particular eraser may no longer be available in the marketplace. Consequently, the NTEP lab evaluators were recently asked to try and identify a suitable replacement for this eraser; but to date, no replacement has been identified.

Recommendation:

The WS is asked to help identify a suitable replacement for the Eberhard Faber ink eraser type #110 that can readily be acquired by all the NTEP labs at a reasonable cost, which will enable the NTEP labs to continue testing the permanence of lettering used to mark required information on a device using the same testing medium.

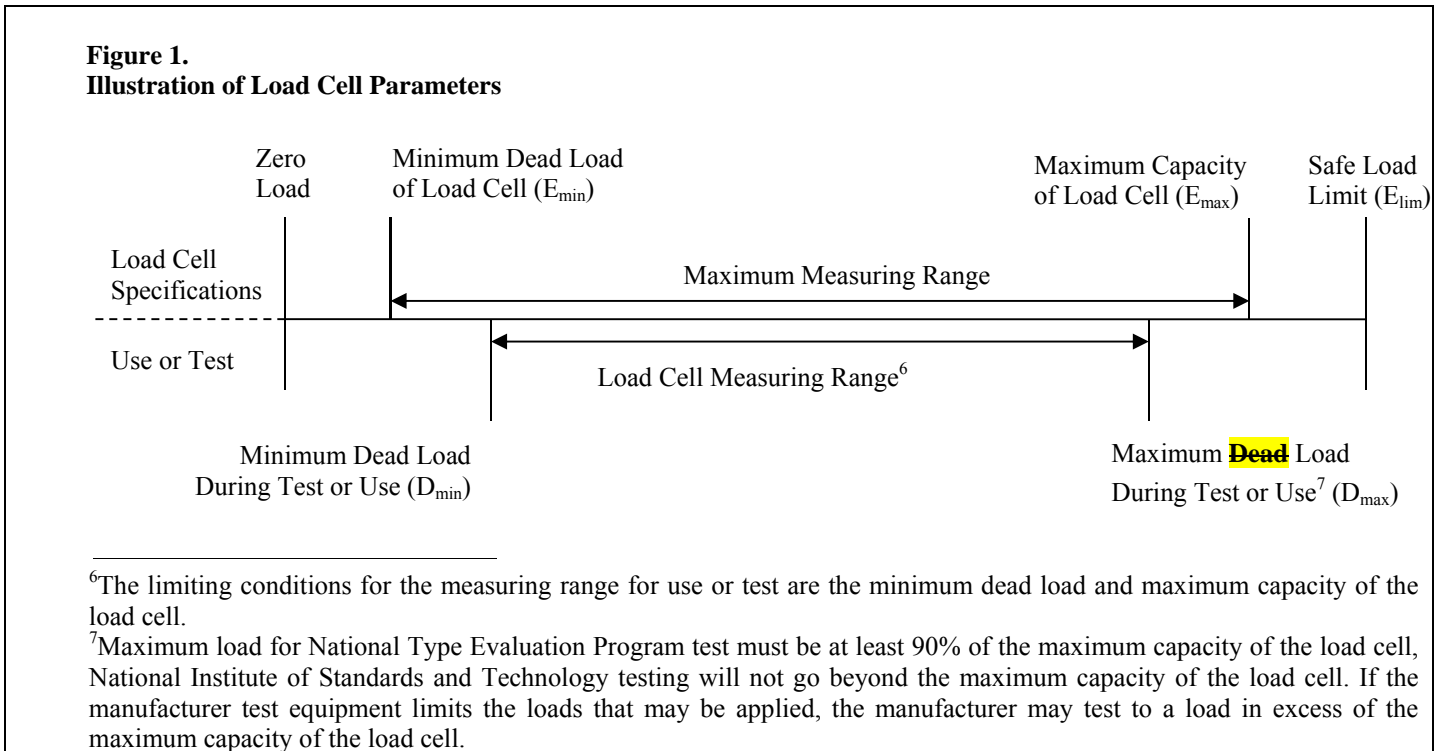
8. NCWM Publication 14 Load Cells - National Type Evaluation Program Terminology for Load Cell Parameters

Source: Mr. Steve Langford, Cardinal Scale

Background / Discussion: Mr. Steve Langford has discovered what he believes to be an editorial error in some of the text included in Figure 1. Illustration of Load Cell Parameters on page LC-19 of NCWM Publication 14 Load Cells. The illustration uses the term “Maximum Dead Load” in association with D_{max} to identify the upper extreme of the load cell measuring range. Mr. Langford believes the word “Dead” should be removed so that the term reads “Maximum Load.” This change would align the text with footnote 7 of the illustration, the definition of D_{max} in NIST Handbook 44, and OIML R60 Section 2.3.6.

Recommendation:

The Sector is asked to review NCWM Publication 14 Load Cells Figure 1. Illustration of Load Cell Parameters and determine whether or not the change suggested by Mr. Langford is appropriate and whether or not additional changes to any of the text included in Figure 1. are needed. Figure 1. Illustration of Load Cell Parameters has been copied from Publication 14 and pasted below with the change suggested by Mr. Langford shaded. Included for reference beneath Figure 1 are definitions of “ D_{max} ” and “ D_{min} ,” which were copied from NIST Handbook 44 and Section 2.3.6., copied from OIML R60.



Appendix D – Definitions NIST Handbook 44:

D_{max} (maximum load of the measuring range). – Largest value of a quantity (mass) which is applied to a load cell during test or use. This value shall not be greater than E_{max} . [2.20] (Added 2005)

D_{min} (minimum load of the measuring range). – Smallest value of a quantity (mass) which is applied to a load cell during test or use. This value shall not be less than E_{min} . [2.20]

(Added 2006)

OIML R 60 Metrological regulation for load cells:

2.3.6 Maximum load of the measuring range (D_{max}) Largest value of a quantity (mass) which is applied to a load cell during test or use. This value shall not be greater than E_{max} (see 2.3.5). For the limits on D_{max} during testing, see A.3.2.4.

9. Identification of Certified Software

Source: NTEP Software Sector

Background: This item originated as an attempt to answer the question “How does the field inspector know that the software running in the device is the same software evaluated and approved by the lab?” In previous meetings it was shown that the international community has addressed this issue (both WELMEC and OIML).

At the 2012 NTETC Software Sector Meeting, there was some discussion as to where the terminology regarding inextricably linking the software version or revision to the software itself belonged. The Sector recommended adding the following to *NCWM Publication 14* and forward to NTETC Weighing, Measuring, Grain Analyzer Sectors for feedback:

Identification of Certified Software:

Note: Manufacturers may choose to separate metrologically significant software from non-metrologically significant software. Separation would allow the revision of the non-metrological portion without the need for further evaluation. In addition, non-metrologically significant software may be updated on devices without breaking a seal, if so designed. Separation of software requires that all software modules (programs, subroutines, objects etc.) that perform metrologically significant functions or that contain metrologically significant data domains form the metrologically significant software part of a measuring instrument (device or sub-assembly). If the separation of the software is not possible or needed, then the software is metrologically significant as a whole. The conformity requirement applies to all parts and parts shall be marked according to Section G-S-X.X.

The manufacturer must describe and possibly demonstrate how the version or revision identifier is directly and inseparably linked to the metrologically significant software. Where the version revision identifier is comprised of more than one part, the manufacturer shall describe which portion represents the metrological significant software and which does not.

Recommendation:

The Software Sector is requesting feedback on the following language developed by the Software Sector in 2012 for possible future inclusion into *NCWM Publication 14 Weighing Devices*, DES pages 22-23, Section 3. Additional Marking Requirements – Not Built-for-Purpose Software-Based Devices:

Identification of Certified Software:

Note: Manufacturers may choose to separate metrologically significant software from non-metrologically significant software. Separation would allow the revision of the non-metrological portion without the need for further evaluation. In addition, non-metrologically significant software may be updated on devices without breaking a seal, if so designed. Separation of software requires that all software modules (programs, subroutines, objects etc.) that perform metrologically significant functions or that contain metrologically significant data domains form the metrologically significant software part of a measuring instrument (device or sub-assembly). If the separation of the software is not possible or needed, then the software is metrologically significant as a whole. The conformity requirement applies to all parts and parts shall be marked according to Section G-S-X.X.

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The manufacturer must describe and possibly demonstrate how the version or revision identifier is directly and inseparably linked to the metrologically significant software. Where the version revision identifier is comprised of more than one part, the manufacturer shall describe which portion represents the metrological significant software and which does not.

10. Software Protection / Security

Source:

NTEP Software Sector

Background

The Sector agreed that *NIST Handbook 44* already has audit trail and physical seal, but these may need to be enhanced.

From the WELMEC Document:

Protection against accidental or unintentional changes

Metrologically significant software and measurement data shall be protected against accidental or unintentional changes.

Specifying Notes:

Possible reasons for accidental changes and faults are: unpredictable physical influences, effects caused by user functions and residual defects of the software even though state of the art of development techniques have been applied.

This requirement includes consideration of:

- a) Physical influences: Stored measurement data shall be protected against corruption or deletion when a fault occurs or, alternatively, the fault shall be detectable.
- b) User functions: Confirmation shall be demanded before deleting or changing data.
- c) Software defects: Appropriate measures shall be taken to protect data from unintentional changes that could occur through incorrect program design or programming errors, e.g. plausibility checks.

Required Documentation:

The documentation should show the measures that have been taken to protect the software and data against unintentional changes.

Example of an Acceptable Solution:

- The accidental modification of software and measurement data may be checked by calculating a checksum over the relevant parts, comparing it with the nominal value and stopping if anything has been modified.
- Measurement data are not deleted without prior authorization, e.g. a dialogue statement or window asking for confirmation of deletion.
- For fault detection see also Extension I.

The Sector continued to develop a proposed checklist for *NCWM Publication 14*. The numbering will still need to be added. This is based roughly on R 76 – 2 checklist and discussions beginning as early as the October 2007 NTETC Software Sector Meeting. The information requested by this checklist is currently voluntary, however, it is recommended that applicants comply with these requests or provide specific information as to why they may not be

able to comply. Based on this information, the checklist may be amended to better fit with NTEP's need for information and the applicant's ability to comply.

The California, Maryland and Ohio laboratories agreed to use this check list on one of the next devices they have in the lab and report back to the Sector on what the problems may be. In February 2011, the North Carolina laboratory was also given a copy of the check list to try.

1. Devices with Embedded Software TYPE P (aka built-for-purpose)	
1.1. Declaration of the manufacturer that the software is used in a fixed hardware and software environment. AND	<input type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> N/A
1.2. Cannot be modified or uploaded by any means after securing/verification. <i>Note: It is acceptable to break the "seal" and load new software, audit trail is also a sufficient seal.</i>	<input type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> N/A
1.3 The software documentation contains:	
1.3.1. Description of all functions, designating those that are considered metrologically significant.	<input type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> N/A
1.3.2. Description of the securing means (evidence of an intervention).	<input type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> N/A
1.3.3. Software Identification, including version / revision	<input type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> N/A
1.3.4. Description how to check the actual software identification.	<input type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> N/A
1.4. The software identification is:	
1.4.1. Clearly assigned to the metrologically significant software and functions.	<input type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> N/A
1.4.2. Description how to check the actual software identification.	<input type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> N/A
1.4.3. Provided by the device as documented.	<input type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> N/A
1.4.4. Directly linked to the software itself.	<input type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> N/A
2. Personal Computers, Instruments with PC Components, and Other Instruments, Devices, Modules, and Elements with Programmable or Loadable Metrologically Significant Software TYPE U (aka not built-for-purpose)	
2.1. The metrologically significant software is:	
2.1.1. Documented with all relevant (see below for list of documents) information.	<input type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> N/A
2.1.2. Protected against accidental or intentional changes.	<input type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> N/A
2.2. Evidence of intervention (such as, changes, uploads, circumvention) is available until the next verification / inspection (e.g., physical seal, Checksum, Cyclical Redundancy Check (CRC), audit trail, etc. means of security).	<input type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> N/A
3. Software with Closed Shell (no access to the operating system and/or programs possible for the user)	
3.1. Check whether there is a complete set of commands (e.g., function keys or commands via external interfaces) supplied and accompanied by short descriptions.	<input type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> N/A
3.2. Check whether the manufacturer has submitted a written declaration of the completeness of the set of commands.	<input type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> N/A
4. Operating System and / or Program(s) Accessible for the User	

4.1	Check whether a checksum or equivalent signature is generated over the machine code of the metrologically significant software (program module(s) subject to legal control Weights and Measures jurisdiction and type-specific parameters).	<input type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> N/A
4.2	Check whether the metrologically significant software will detect and act upon any unauthorized alteration of the metrologically significant software using simple software tools (e.g., text editor).	<input type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> N/A
5. Software Interface(s)		
5.1	Verify the manufacturer has documented:	
5.1.1.	The program modules of the metrologically significant software are defined and separated.	<input type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> N/A
5.1.2.	The protective software interface itself is part of the metrologically significant software.	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> N/A
5.1.3.	The functions of the metrologically significant software that can be accessed via the protective software interface.	<input type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> N/A
5.1.4.	The parameters that may be exchanged via the protective software interface are defined.	<input type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> N/A
5.1.5.	The description of the functions and parameters are conclusive and complete.	<input type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> N/A
5.1.6.	There are software interface instructions for the third party (external) application programmer.	<input type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> N/A

The Maryland laboratory had particular questions regarding 3.1 and 5.1. The information for 3.1 could be acquired from an operator’s manual, a training video, or in-person training. The items in 5.1 were confusing to the evaluators. The terminology is familiar to software developers, but not necessarily others. It was indicated that manufacturers were typically quick to return the filled out questionnaire, but he didn’t know how his laboratory was supposed to verify that it was true. Generally, the laboratories wouldn’t be expected to verify things to that level. For example, if the manufacturer states that a checksum is used to ensure integrity, the laboratories wouldn’t be expected to evaluate the algorithm used.

The intent was to see whether the manufacturer had at least considered these issues, not for evaluators to become software engineers. Perhaps a glossary or descriptive paragraphs might be added to assist the evaluators for if the manufacturer has questions for the evaluators.

OIML makes use of supplementary documents to explain the checklist they use. Below are links:

<http://www.oiml.org/publications/D/D031-e08.pdf>

<http://www.welmec.org/latest/guides/72.html>

http://www.welmec.org/fileadmin/user_files/publications/2-3.pdf

WELMEC document 2.3 is the original source for our checklist, but it’s been significantly revised and simplified. Mr. Payne, Maryland Department of Agriculture, is going to review the other documents and come up with some suggestions for the checklist. Mr. Roach, California Division of Measurement Standards, is going to begin using the checklist. The international viewpoint is that any device running an operating system is considered to be Type U. Mr. Roach mentioned that they’re having lots of problems with “skimmers” stealing PIN’s. Is there some way they can detect this?

Mr. Lewis, Rice Lake Weighing Systems, Inc., mentioned that he liked Measurement Canada’s website. When answering similar questions, different pages would appear, based on answers to those questions: <http://www.ic.gc.ca/eic/site/mc-mc.nsf/eng/lm00573.html>

At the 2011 NTETC Software Sector Meeting, the laboratories were polled to obtain any feedback on the use of the checklist. Maryland attempted to use this checklist a few times. They had some difficulty obtaining answers from the manufacturers because the individual(s) interacting with the Maryland evaluator didn't always have the required information on hand. More experience in using the checklist will help determine what needs to be revised.

It was suggested that the checklist could be sent to manufacturers for their feedback as well, with the stipulation that it a completely voluntary exercise and purely informational at this point. The laboratories will coordinate with willing manufacturers to obtain feedback.

Work is ongoing on this item with the intent that it eventually will be incorporated as a checklist in *NCWM Publication 14*; again the laboratories are requested to try utilizing this checklist for any evaluations on software-based electronic devices.

The checklist has been reviewed with an eye to making its terminology clearer to laboratories. Some examples and clarifications have been added as shown in the discussion section of this item. The revised checklist will be distributed to the laboratories for additional review. Maryland and California laboratories agreed to use the checklist on a trial basis.

Discussion:

Over the past year, attempts to use the current checklist did not meet with many difficulties. The checklists were given to the manufacturers to fill out, and that seemed to work rather well. Minor modifications (in red above) were made to clarify certain confusing areas or eliminate redundancy.

Recommendation:

The Software Sector is recommending that each NTETC Sector consider adding the proposed software checklist (shown in the table above) to their respective and appropriate NCWM Publication 14 device checklists. Thus, the WS is to consider whether or not it is appropriate to add the proposed software checklist to Publication 14, and if so, to which of the checklists within Pub 14 Weighing Devices it is be included, e.g., DES, AWS,

Note: Based upon the background information provided in the proposal and the sentence shown above under the heading of "Conclusion," the NIST Technical Advisor believes that the Software Sector intends for the modifications included in the table as follows are to be a part of their proposal:

- *Bold faced text that has been struck through is to be deleted; and*
- *Shaded regular text is to be included.*

11. Software Maintenance and Reconfiguration

Source:

NTEP Software Sector

Background

After the software is completed, what do the manufacturers use to secure their software? The following items were reviewed by the Sector. *Note that agenda Item 3 also contains information on Verified and Traced updates and Software Log.*

1. Verify that the update process is documented (OK)
2. For traced updates, installed Software is authenticated and checked for integrity
 Technical means shall be employed to guarantee the authenticity of the loaded software (i.e. that it originates from the owner of the type approval certificate). This can be accomplished (e.g. by cryptographic means like signing). The signature is checked during loading. If the loaded software fails this test, the instrument shall discard it and either use the previous version of the software **or become inoperative.**

Technical means shall be employed to guarantee the integrity of the loaded software i.e. that it has not been inadmissibly changed before loading. This can be accomplished e.g. by adding a checksum or hash code of the loaded software and verifying it during the loading procedure. If the loaded software fails this test, the instrument shall discard it and either use the previous version of the software **or become inoperative.**

Examples are not limiting or exclusive.

3. Verify that the sealing requirements are met
The Sector asked, What sealing requirements are we talking about?

This item is **only** addressing the **software update**, it can be either verified or traced. It is possible that there are two different security means, one for protecting software updates (software log) and one for protecting the other metrological parameters (Category I II or III method of sealing). Some examples provided by the Sector members include but are not limited to:

Physical Seal, software log
Category III method of sealing can contain both means of security

4. Verify that if the upgrade process fails, the device is inoperable or the original software is restored

The question before the group is, Can this be made mandatory?

The manufacturer shall ensure by appropriate technical means (e.g. an audit trail) that traced updates of metrologically significant software are adequately traceable within the instrument for subsequent verification and surveillance or inspection. This requirement enables inspection authorities, which are responsible for the metrological surveillance of legally controlled instruments, to back-trace traced updates of metrologically significant software over an adequate period of time (that depends on national legislation). The statement in italics will need to be reworded to comply with US weights and measures requirements.

The Sector **agreed** that the two definitions below for Verified update and Traced update were acceptable.

Verified Update

A verified update is the process of installing new software where the security is broken and the device must be re-verified. Checking for authenticity and integrity is the responsibility of the owner/user.

Traced Update

A traced update is the process of installing new software where the software is automatically checked for authenticity and integrity, and the update is recorded in a software update log or audit trail.

Note: It's possible that the Philosophy of Sealing section of NCWM Publication 14 may already address the above IF the definitions of Verified and Traced Updates (and the statement below) were to be added. The contrary argument was that it may be better to be explicit).

Use of a Category 3 audit trail is required for a Traced Update. A log entry representing a traced software update shall include the software identification of the newly installed version.

The Sector recommended consolidating the definitions with the above statement thus:

Verified Update

A verified update is the process of installing new software where the security is broken and the device must be re-verified. Checking for authenticity and integrity is the responsibility of the owner/user.

Traced Update

A traced update is the process of installing new software where the software is automatically checked for authenticity and integrity, and the update is recorded in a ~~software update log or~~ Category 3 audit trail. The audit trail entry shall include the software identification of the newly installed version.

In 2012, the Sector recommended that as a first step, the following be added to *NCWM Publication 14*:

The updating of metrologically significant software, including software that checks the authenticity and integrity of the updates, shall be considered a sealable event.

Mr. Truex, NTEP Administrator, indicated his opinion that the above sentence is unnecessary since it's self-evident. It was agreed by the group however to ask the other sectors for feedback on the value of this addition.

Though the Sector is currently considering only the single sentence be incorporated into *NCWM Publication 14* for the time being, ultimately, the Sector may wish to advance the remaining language of the original item submission.

Discussion:

The Sector had no information indicating that the other Sectors had yet been approached for feedback on the value of the addition of the proposed sentence.

Recommendation:

The Software Sector is requesting each of the NTETC Sectors review and provide feedback on the following draft language it developed for consideration of adding it to *NCWM Publication 14*:

The updating of metrologically significant software, including software that checks the authenticity and integrity of the updates, shall be considered a sealable event.

Should the WS agree this language is appropriate, it might then consider where within *Publication 14 Weighing Devices* this sentence should be inserted. The Sector might consider including it in the appropriate sealing sections of *Publication 14* relating to audit trails, e.g., possibly *DES Section 10 Provision For Metrological Sealing of Adjustable Components or Audit Trail*, *DES Appendix B Requirements for Metrological Audit Trails*, *AWS Section 8 Provision for Metrological Sealing of Adjustable Components or Audit Trail for Other than Automatic Checkweighers*, and *AWS Appendix B Requirements for Metrological Audit Trails*.

The Software Sector is also requesting feedback from the other NTETC Sectors regarding whether or not additional language is needed in *Publication 14* to make clear that an existing audit trail should be protected during a software update. In the background information provided for this item, it was noted that the Software Sector noted that this does already seem to be addressed in the *Requirements for Metrological Audit Trails in Publication 14*. *Technical Advisor's note: NCWM Publication 14 DES Appendix B item 5 b. on page DES – 156 of General Requirements for Metrological Audit Trails addresses the protection of audit trail data as follows and may be why the SS has indicated that this issue already seems to be addressed in Publication 14:*

5. The audit trail data shall be:
 - a. Stored in non-volatile memory and shall be retained for at least 30 days if power is removed from the device. **AND**
 - b. Protected from unauthorized erasure, substitution, or modification.

This same provision also appears in Publication 14 AWS Appendix B.

ATTACHMENTS

Appendix A - 2013 NTEP Weighing Sector Attendees (to be included in the Sector report)