

CWMA Specifications and Tolerances (S&T) Committee 2022 Annual Meeting Report

Mr. Charles Stutesman, Committee Chair
Kansas

INTRODUCTION

1 The S&T Committee (hereinafter referred to as the “Committee”) submits this Committee Annual Meeting Report for
2 consideration by National Conference on Weights and Measures (NCWM). This report contains the items discussed
3 and actions proposed by the Committee during the Annual Meeting. The report will address the items in Table A
4 during the Interim Meeting. Table A identifies the agenda items by reference key, title of item, page number and the
5 appendices by appendix designations. The acronyms for organizations and technical terms used throughout the agenda
6 are identified in Table B. The headings and subjects apply to NIST Handbook 44 *Specifications, Tolerances, and*
7 *Other Technical Requirements for Weighing and Measuring Devices*. The first three letters of an item’s reference key
8 are assigned from the Subject Series List. The status of each item contained in the report is designated as one of the
9 following: **(D) Developing Item:** the Committee determined the item has merit; however, the item was returned to
10 the submitter or other designated party for further development before any action can be taken at the national level;
11 **(A) Assigned Item:** the committee has assigned development of the item to a recognized subcommittee or task group
12 within NCWM. **(I) Informational Item:** the item is under consideration by the Committee but not proposed for
13 Voting; **(V) Voting Item:** the committee is making recommendations requiring a vote by the active members of
14 NCWM; **(W) Withdrawn Item:** the item has been removed from consideration by the Committee.

15 Some Voting Items are considered individually; others may be grouped in a consent calendar. Consent calendar items
16 are Voting Items that the Committee has assembled as a single Voting Item during their deliberation after the Open
17 Hearings on the assumption that the items are without opposition and will not require discussion. The Voting Items
18 that have been grouped into consent calendar items will be listed on the addendum sheets. Prior to adoption of the
19 consent calendar, the Committee will remove specific items from the consent calendar upon request to be discussed
20 and voted upon individually.

21 Committees may change the status designation of agenda items (Developing, Informational, Assigned, Voting and
22 Withdrawn) up until the report is adopted, except that items which are marked Developing, Informational, Assigned
23 or Withdrawn cannot be changed to Voting Status. Any change from the Committee Interim Report (as contained in
24 this publication) or from what appears on the addendum sheets will be explained to the attendees prior to a motion
25 and will be acted upon by the active members of NCWM prior to calling for the vote.

26 An “Item under Consideration” is a statement of proposal and not necessarily a recommendation of the Committee.
27 Suggested revisions are shown in **bold face print** by ~~striking out~~ information to be deleted and **underlining**
28 information to be added. Requirements that are proposed to be nonretroactive are printed in **bold faced italics**.
29 Additional letters, presentation and data may have been submitted for consideration with this item. Please refer to
30 <https://www.ncwm.com/publication-16> to review these documents.

31 All sessions are open to registered attendees of the conference. If the Committee must discuss any issue that involves
32 proprietary information or other confidential material; that portion of the session dealing with the special issue may
33 be closed if (1) the Chairman or, in his absence, the Chairman-Elect approves; (2) the Executive Director is notified;
34 and (3) an announcement of the closed meeting is posted on or near the door to the meeting session and at the
35 registration desk. If possible, the posting will be done at least a day prior to the planned closed session.

Note: It is policy to use metric units of measurement in publications; however, recommendations received by NCWM
technical committees and regional weights and measures associations have been printed in this publication as
submitted. Therefore, the report may contain references to inch-pound units.

Subject Series List

Handbook 44 – General Code.....	GEN Series
Scales.....	SCL Series
Belt-Conveyor Scale Systems	BCS Series
Automatic Bulk Weighing Systems	ABW Series
Weights.....	WTS Series
Automatic Weighing Systems	AWS Series
Weigh-In-Motion Systems used for Vehicle Enforcement Screening.....	WIM Series
Liquid-Measuring Devices	LMD Series
Vehicle-Tank Meters	VTM Series
Liquefied Petroleum Gas and Anhydrous Ammonia Liquid-Measuring Devices	LPG Series
Hydrocarbon Gas Vapor-Measuring Devices.....	HGV Series
Cryogenic Liquid-Measuring Devices.....	CLM Series
Milk Meters	MLK Series
Water Meters	WTR Series
Mass Flow Meters	MFM Series
Carbon Dioxide Liquid-Measuring Devices.....	CDL Series
Hydrogen Gas-Metering Devices	HGM Series
Electric Vehicle Refueling Systems	EVF Series
Vehicle Tanks Used as Measures	VTU Series
Liquid Measures	LQM Series
Farm Milk Tanks	FMT Series
Measure-Containers.....	MRC Series
Graduates.....	GDT Series
Dry Measures	DRY Series
Berry Baskets and Boxes.....	BBB Series
Fabric-Measuring Devices.....	FAB Series
Wire-and Cordage-Measuring Devices	WAC Series
Linear Measures	LIN Series
Odometers	ODO Series
Taximeters.....	TXI Series
Timing Devices	TIM Series
Grain Moisture Meters (a).....	GMA Series
Grain Moisture Meters (b).....	GMB Series
Near-Infrared Grain Analyzers.....	NIR Series
Multiple Dimension Measuring Devices	MDM Series
Electronic Livestock, Meat, and Poultry Evaluation Systems and/or Devices.....	LVS Series
Transportation Network Measuring Systems	TNS Series
Other Items	OTH Series

**Table A
Table of Contents**

Reference Key		Title of Item	S&T Page
GEN – GENERAL CODE			149
GEN-22.1	V	G.A.1. Commercial and Law-Enforcement Equipment	149
GEN-19.1	D	G-T.5. Tolerances on Tests When Transfer Standards are Used., Appendix A, Section 3.2. Tolerances for Standards., and Appendix D – Definitions: standards, field., transfer standard. and standard, transfer,	152
SCL – SCALES			152
SCL-20.9	W	S.1.1.3. Zero Indication, Load Receiving Elements Separate from Weighing Elements. and Appendix D – Definitions: no load reference value	152
SCL-22.2	A	UR.1. Selection Requirements, UR.1.X. Cannabis	155
LMD – LIQUID MEASURING DEVICES			159
LMD-21.1	V	Table S.2.2. Categories of Device and Method of Sealing	159
LMD-22.1	V	Table T.2. Accuracy Classes and Tolerances for Liquid Measuring Devices Covered in NIST Handbook 44, Section 3.30	162
VTM – VEHICLE TANK METERS			165
VTM-18.1	V	S.3.1 Diversion of Measured Liquid and S.3.1.1. Means for Clearing the Discharge Hose and UR.2.6. Clearing the Discharge on a multiple-product, single discharge hose.	165
VTM-20.2	A	Table T.2. Tolerances for Vehicle Mounted Milk Meters.	173
LPG – LIQUIFIED PETROLEUM GAS AND ANHYDROUS AMMONIA LIQUID-MEASURING DEVICES			181
LPG-22.1	V	A.1. General., and Appendix D – Definitions. Liquefied Petroleum Gas Retail Motor Fuel Device.	181
LPG-15.1	D	N.3. Test Drafts.	184
LPG-22.2	W	S.2.6. Zero-Set-Back Interlock, for Stationary Customer-Operated Retail Motor-Fuel Devices, Electronic.	191
LPG-22.3	D	S.2.5. <i>Zero-Set-Back Interlock.</i> , S.2.5.2. <i>Zero -Set-Back Interlock for Stationary Customer -Operated Electronic Retail Motor-Fuel Devices.</i>	194
MFM – MASS FLOW METERS			199
MFM-15.1	D	N.3. Test Drafts.	199
MFM-22.1	V	Table T.2. Accuracy Classes and Tolerances for Mass Flow Meters.	206
EVF – ELECTRIC VEHICLE FUELING SYSTEMS			210
EVF-21.1	D	A.1. General.	210
EVF-20.1	V	S.1.3.2. EVSE Value of the Smallest Unit.	214
EVF-21.5	D	T.2. Load Test Tolerances.	218
TXI – TAXIMETERS			223
TXI-22.1	V	Table S.5. Categories of Device and Methods of Sealing.	223
GMA – GRAIN MOISTURE METERS 5.56 (A)			225
GMA-19.1	D	Table T.2.1. Acceptance and Maintenance Tolerances Air Oven Method for All Grains and Oil Seeds.	225
MDM – MULTIPLE DIMENSION MEASURING DEVICES			228
MDM-22.1	D	S.1.7. Minimum Measurement.	228
OTH – OTHER ITEMS			230
OTH-16.1	D	Electric Watthour Meters Code under Development	230
OTH-22.1	D	Appendix A: Fundamental Considerations, 3. Testing Apparatus	235

OTH-22.2	V	Appendix D – Definitions: face	235
ITEM BLOCK 1 (B1)		TERMINOLOGY FOR TESTING STANDARDS	238
B1: SCL-18.1	W	N.2. Verification (Testing) Standards	238
B1: ABW-18.1	W	N.2. Verification (Testing) Standards	238
B1: AWS-18.1	W	N.1.3. Verification (Testing) Standards, N.3.1. Official Tests, UR.4. Testing Standards	239
B1: CLM-18.1	W	N.3.2. Transfer Standard Test and T.3. On Tests Using Transfer Standards	239
B1: CDL-18.1	W	N.3.2. Transfer Standard Test, T.3. On Tests Using Transfer Standards	239
B1: HGM-18.1	W	N.4.1. Master Meter (Transfer) Standard Test, T.4. Tolerance Application on Test Using Transfer Standard Test Method	240
B1: GMA-18.1	W	5.56(a): N.1.1. Air Oven Reference Method Transfer Standards, N.1.3. Meter to Like-Type Meter Method Transfer Standards and 5.56(b): N.1.1. Transfer Standards, T. Tolerances ¹	240
B1: LVS-18.1	W	N.2. Testing Standards	241
B1: OTH-18.1	W	Appendix A: Fundamental Considerations, 3.2. Tolerances for Standards, 3.3. Accuracy of Standards	241
B1: OTH-18.2	W	Appendix D – Definitions: fifth-wheel, official grain samples, transfer standard and Standard, Field	241
BLOCK 2 ITEMS (B2)		DEFINE TRUE VALUE FOR USE IN ERROR CALCULATIONS	246
B2: SCL-20.3	A	S.5.4. Relationship of Minimum Load Cell Verification Interval to the Scale Division	246
B2: SCL-20.4	A	Table 3. Parameters of Accuracy Classes.	247
B2: SCL-20.5	A	Table S.6.3.a. Marking Requirements, Note 3.	249
B2: SCL-20.6	A	T.N.1.2. Accuracy Classes and T.N.1.3. Scale Division.	250
B2: SCL-20.7	A	Table 7. Maintenance Tolerances	250
B2: SCL-20.8	A	Table 8. Recommended Minimum Load	251
BLOCK 3 ITEMS (B3)		TOLERANCES FOR DISTANCE TESTING IN TAXIMETERS AND TRANSPORTATION NETWORK SYSTEMS	261
B3: TXI-20.1	D	T. Tolerances	261
B3: TNS-20.1	D	T. Tolerances	262
BLOCK 4 ITEMS (B4)		ELECTRONICALLY CAPTURED TICKETS OR RECEIPTS	266
B4: GEN-21.2	D	G-S.5.6. Recorded Representations.	266
B4: LMD-21.2	D	S.1.6.5. Money Value Computations., UR.3. Use of a Device.	266
B4: VTM-21.1	D	S.1.1. Primary Elements., UR.2. User Requirements	269
B4: LPG-21.1	D	S.1.1. Primary Elements., UR.2. User Requirements	270
B4: CLM-21.1	D	S.1.4.1. Printed Ticket Recorded Representation., UR.2.6.3. Printed Ticket Recorded Representation.	272
B4: MLK-21.1	D	S.1.4.2. Printed Ticket Recorded Representation., UR.2.6.3. Printed Ticket Recorded Representation.	272
B4: MFM-21.2	D	S.6. Printer Recorded Representations., UR.2.6. Ticket Printer, Customer Ticket, Recorded Representation., UR.3.4. Printed Ticket. Recorded Representation.	273
B4: CDL-21.1	D	S.1.4.1. Printed Ticket Recorded Representations., UR.2.4.2. Tickets or Invoices. Recorded Representation.	273
B4: HGM-21.1	D	S.2.6. Recorded Representations, Point of Sale Systems., S.6. Printer. Recording Element., UR.3.2. Vehicle-mounted Measuring Systems Ticket Printer Recording Element., UR.3.3. Printed Ticket. Recorded Representation.	274
B4: OTH-21.2	D	Appendix D - Definitions.: recorded representations, recording element.	275
ITEM BLOCK 5 (B5)		DEFINE “FIELD REFERENCE STANDARD”	278
B5: CLM-18.2	W	N.3.2. Transfer Standard Test and T.3. On Tests Using Transfer Standards	278
B5: CDL-18.2	W	N.3.2. Transfer Standard Test and T.3. On Tests Using Transfer Standards	278
B5: HGM-18.2	W	N.4.1. Master Meter (Transfer) Standard Test and T.4. Tolerance Application on Test Using Transfer Standard Test Method	279

B5: OTH-18.3 W Appendix D – Definitions: field reference standard meter ~~and transfer standard~~ 279

BLOCK 6 ITEMS (B6) COMMERCIAL AND LAW ENFORCEMENT, AXLE AND AXLE GROUP WEIGHTS 282

B6: SCL-22.1 D Recorded Representation of Axle or Axle Group Weights 282

B6: SCL-22.3 D UR.3.3. Single-Draft Vehicle Weighing., and UR.3.4. Axle and Axle Group Weight Values. 283

BLOCK 7 ITEMS (B7) TOLERANCES ON TESTS USING TRANSFER STANDARDS 289

B7: CLM-22.1 D T.3. On Tests Using Type 2 Transfer Standards. 289

B7: CDL-22.1 D T.3. On Tests Using Type 2 Transfer Standards. 289

B7: HGM-22.1 D T.4. Tolerance Application on Tests Using Type 2 Transfer Standard Test Method. 290

BLOCK 8 ITEMS (B8) TOLERANCES ON TESTS USING TRANSFER STANDARDS, APPENDIX A - TOLERANCES FOR STANDARDS, AND APPENDIX D – FIELD STANDARDS AND TRANSFER STANDARDS 292

B8: GEN-19.1 D G-T.5. Tolerances on Tests When Transfer Standards are Used., Appendix A, Section 3.2. Tolerances for Standards., and Appendix D – Definitions: standards, field., ~~transfer standard~~ and standard, transfer. 293

B8: OTH-22.1 D Appendix A: Fundamental Considerations, 3. Testing Apparatus 294

Appendices

A Item Block 2 – Final Report of the Verification Scale Division Task Group A273

Table B
Glossary of Acronyms and Terms

Acronym	Term	Acronym	Term
ABWS	Automatic Bulk Weighing System	NEWMA	Northeastern Weights and Measures Association
AAR	Association of American Railroads	NIST	National Institute of Standards and Technology
API	American Petroleum Institute	NTEP	National Type Evaluation Program
CNG	Compressed Natural Gas	OIML	International Organization of Legal Metrology
CWMA	Central Weights and Measures Association	OWM	Office of Weights and Measures
EPO	Examination Procedure Outline	RMFD	Retail Motor Fuel Dispenser
FHWA	Federal Highway Administration	S&T	Specifications and Tolerances
GMM	Grain Moisture Meter	SD	Secure Digital
GPS	Global Positioning System	SI	International System of Units
HB	Handbook	SMA	Scale Manufacturers Association
LMD	Liquid Measuring Devices	SWMA	Southern Weights and Measures Association
LNG	Liquefied Natural Gas	TC	Technical Committee
LPG	Liquefied Petroleum Gas	USNWG	U.S. National Work Group
MMA	Meter Manufacturers Association	VTM	Vehicle Tank Meter
MDMD	Multiple Dimension Measuring Device	WIM	Weigh-in-Motion
NCWM	National Conference on Weights and Measures	WWMA	Western Weights and Measures Association

Details of All Items
(In order by Reference Key)

1 **GEN – GENERAL CODE**

2 **GEN-22.1 V G.A.1. Commercial and Law-Enforcement Equipment.**

3 **Source:**

4 NIST, Office of Weights and Measures

5 **Purpose:**

6 This proposed change is intended to add clarification regarding the implications of using weighing and measuring
7 devices for transactions that may be considered by some as commercial while there is no clear guidance provided.

8
9 **Item Under Consideration:**

10 Amend Handbook 44, General Code as follows:

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

13 **(1) To commercial weighing and measuring equipment; that is:**

14 (a) To weights and measures and weighing and measuring devices commercially used or employed in:

15 **1.** establishing the size, quantity, extent, area, composition (limited to meat and poultry),
16 constituent values (limited to grain), or measurement of quantities, things, produce, or articles
17 for distribution or consumption, purchased, offered, or submitted for sale, hire, or award;

18 **2.** **assessing a fee for the use of the equipment to determine a weight or measure;**

19 **3.** **determining the basis of an award using count, weight, or measure; or**

20 **4.** computing any basic charge or payment for services rendered on the basis of weight or measure.
21 (Amended 2008 **and 20XX**)

22 (b) To any accessory attached to or used in connection with a commercial weighing or measuring device
23 when such accessory is so designed that its operation affects the accuracy of the device.

24 **(2)** To weighing and measuring equipment in official use for the enforcement of law or ~~for~~ the collection of
25 statistical information by government agencies.

26 (These requirements should be used as a guide by the weights and measures official when, upon request, courtesy
27 examinations of noncommercial equipment are made.)

28 **Previous Action:**

29 Item under consideration presented to 2022 NCWM Interim meeting as:

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

32 (a) To commercial weighing and measuring equipment; that is, to weights and measures and weighing and
33 measuring devices commercially used or employed in establishing the size, quantity, extent, area,

1 composition (limited to meat and poultry), constituent values (limited to grain), or measurement of
2 quantities, things, produce, or articles for distribution or consumption, purchased, offered, or submitted
3 for sale, ~~hire, or award, or in computing any basic charge or payment for services rendered on the~~
4 ~~basis of weight or measure.~~

5 (Amended 2008 and 20XX)

6 (b) To other commercial weighing and measuring equipment:

7 i. when there is a fee assessed for the use of the equipment to determine a weight or
8 measure;

9 ii. used to determine the bases of an award using count, weight, or measure; or

10 iii. used in computing any basic charge or payment for services rendered on the basis of weight
11 or measure

12 (Added 20XX)

13
14 ~~(bc)~~ To any accessory attached to or used in connection with a commercial weighing or measuring device
15 when such accessory is so designed that its operation affects the accuracy of the device.

16 ~~(ed)~~ To weighing and measuring equipment in official use for the enforcement of law or for the collection of
17 statistical information by government agencies.

18 (These requirements should be used as a guide by the weights and measures official when, upon request, courtesy
19 examinations of noncommercial equipment are made.)

20 **Original Justification:**

21 OWM has noted a number of inquiries submitted to our office for explanation on the many and various issues involved
22 with the use of weighing or measuring devices as commercial devices when there is charge for doing so. Law
23 enforcement devices may be regulated in a different manner than commercial devices (e.g., allows highway weight
24 limit enforcement through multi-draft weighing) when commercial devices are not allowed to be used in that way.

25 The submitter pointed out that there seems to be a difference in opinions regarding this practice constitutes a
26 commercial transaction.

27 The submitter requested voting status for these items in 2022.

28 **Comments in Favor:**

29 **Regulatory:**

- 30 •

31 **Industry:**

- 32 • The item received support from multiple sources across industry.

33 **Advisory:**

- 34 • Submitter spoke in support of separating the item from its Block 6 companions and giving it a voting
35 status.

36 **Comments Against:**

37 **Regulatory:**

- 38 •

39 **Industry:**

- 40 •

41 **Advisory:**

1 •

2 **Neutral Comments:**

3 **Regulatory:**

- 4 • Advice was heard and supported to align GEN 22.1 language with companion L&R item WAM 22.1.
- 5 Multiple comments were heard supporting the continued development of the item in order to align and
- 6 clarify language to avoid any confusion. There was an emphasis on defining non-commercial vs.
- 7 commercial.

8 **Industry:**

9 •

10 **Advisory:**

11 •

12 **Item Development:**

13 NCWM 2022 Interim Meeting: During the S&T Committee work session, the committee agreed to remove item GEN

14 22.1 from Block 6. The committee recommendations pertain only to item GEN 22.1 and not to Block 6. The committee

15 recommends a voting status for GEN 22.1 with the revised version shown initially as the item under consideration and

16 the original version shown subsequently as previous action. Updates were for clarity and to match language in Laws

17 and Regulations Block 2 item WAM 22.1.

CWMA Report: GEN-22.1
<p>Regional recommendation to NCWM on item status:</p> <ul style="list-style-type: none"> <input checked="" type="checkbox"/> Recommend as a Voting Item on the NCWM agenda <input type="checkbox"/> Recommend as an Information Item on the NCWM agenda <input type="checkbox"/> Recommend as an Assigned Item on the NCWM agenda <i>(To be developed by an NCWM Task Group or Subcommittee)</i> <input type="checkbox"/> Recommend as a Developing Item on the NCWM agenda <i>(To be developed by source of the proposal)</i> <input type="checkbox"/> Recommend Withdrawal of the Item from the NCWM agenda <i>(In the case of new proposals, do not forward this item to NCWM)</i> <input type="checkbox"/> No recommendation from the region to NCWM <i>(If this is a new proposal, it will not be forwarded to the national committee by this region)</i>
<p>Comments and justification for the regional recommendation to NCWM: <i>(This will appear in NCWM reports)</i></p> <p>Jan Konijnenburg – NIST OWM – Stated fully developed and ready for a vote. Russ Vires – SMA – Supports the item Konrad Crockford – ND – Supports the item Charlie Stutesman – KS – Believes final determination of a device should be decided by the local jurisdiction and item should not move forward Doug Musick – KS – The word commercial should be stricken from Line 13 on page 149 as well as Line 6 on page 150. The CWMA S&T Committee believes this item is fully developed and should remain a voting item with the following changes: Page 149 Line 13, <u>(1) To commercial weighing and measuring equipment; that is:</u></p>

20

21 Additional letters, presentation and data may have been submitted for consideration with this item. Please refer to

22 <https://www.ncwm.com/publication-16> to review these documents.

1 **GEN-19.1 D G-T.5. Tolerances on Tests When Transfer Standards are Used., Appendix**
2 **A, Section 3.2. Tolerances for Standards., and Appendix D – Definitions:**
3 **standards, field., ~~transfer standard.~~ and standard, transfer,**

4 This item was modified and combined with Item OTH-22.1 and resides in Block 8.

5 **SCL – SCALES**

6 **SCL-20.9 W S.1.1.3. Zero Indication, Load Receiving Elements Separate from Weighing**
7 **Elements. and Appendix D – Definitions: no load reference value**

8 *NOTE: This item was carried over from the 2020 Interim Meeting however, it was not a Voting item and therefore not*
9 *discussed during the continuation of the 2020 Annual Meeting. Instead, the item was placed on the 2021 Interim*
10 *Meeting's agenda and was discussed during that meeting.*

11 *The original 2021 Interim Meeting Report did not include the updated Item Under Discussion. It was corrected for*
12 *Publication 16 on May 27, 2021.*

13 **Source:**

14 Kansas Department of Agriculture

15 **Purpose:**

16 This item is intended to be applied to weighing devices utilizing a hopper that, once programmed, weigh in multiple
17 drafts to complete the weighing cycle (automatic operation) and that in the course of the normal weighing cycle may
18 not return to zero because of material remaining in the hopper.

19 **Item Under Consideration:**

20 Amend Handbook 44, Scales Code as follows:

21 **S.1.1.2. No-Load Reference Value. –**

22 **S.1.1.2.1. Single Draft Manually Operated Receiving Hopper.-** On a single draft manually operated
23 receiving hopper scale installed below grade, used to receive grain, and utilizing a no-load reference value,
24 provision shall be made to indicate and record the no-load reference value prior to the gross load value.
25 (Added 1983)

26 **S.1.1.2.2. Digital Indicating Hopper Scales Designed for Automatic Operation- Provisions shall be made**
27 **to indicate and record a no-load reference value on both sides of zero**
28 **(Nonretroactive as of January 1, 20XX)**

29 **S.2.1. Zero-Load Adjustment.**

30 **S.2.1.7. Digital Indicating Hopper Scales Designed for Automatic Operation. - The weighing system shall**
31 **be equipped with semiautomatic means by which the zero-load may be adjusted when the indication is**
32 **stable within plus or minus 1.0 scale division and the weighing cycle is not in operation.**

33 **Automatic zero-tracking and automatic zero-setting mechanisms shall not operate during the weighing**
34 **cycle.**
35 **(Nonretroactive as of January 1, 20XX)**

36 **S.2.6. Weighing and Recording Sequence for Digital Indicating Hopper Scales Designed for Automatic**
37 **Operation**

1 S.2.6.1. Weighing Sequence. – For weighing systems used to receive (weigh in), the no-load reference
2 value shall be determined and recorded only at the beginning of each weighing cycle. For systems used to
3 deliver (weigh out), the no-load reference value shall be determined and recorded only after the gross load
4 reference value for each weighing cycle has been indicated and recorded.
5 (Nonretroactive as of January 1, 20XX)

6 S.2.6.2. Recording Sequence. – Provision shall be made so that all weight values are indicated until the
7 completion of the recording of the indicated value.
8 (Nonretroactive as of January 1, 20XX)

9 S.3.4. Interlocks and Flow Control-Digital Indicating Hopper Scales Designed for Automatic Operation.

10 S.3.1. Flow Control. – Provision shall be made to clearly indicate to the operator the status of product flow
11 to and from the weigh hopper.

12 S.3.2. Interlocks. – Each system shall have operating interlocks to provide for the following:

13 (a) Product cannot be cycled and weighed if the weight recording element is disconnected or
14 subjected to a power loss.

15 (b) The recording element cannot print a weight if either of the flow control mechanism leading
16 directly to or from the weigh hopper is operating.

17 (c) A “low paper” sensor, when provided, is activated.

18 (d) The system will operate only in the proper sequence in all modes of operation.

19 (e) When an overflow alarm is activated, the system shall indicate and record an overflow condition.

20 S.3.5. Overflow Sensor.

21 (a) The load-receiving element shall be equipped with an overflow sensor which will cause the flow control
22 mechanism filling the load-receiving element to become inactive, activate an alarm, and inhibit weighing
23 until the overflow condition has been corrected.

24 (b) If the system is equipped with a lower garner or surge bin, that garner shall also be equipped with an
25 overflow sensor which will cause the flow control mechanism emptying the load-receiving element to remain
26 open, activate an alarm, and inhibit weighing until the overflow condition has been corrected.
27 [Nonretroactive as of January 1, 20XX]

28 And amend Appendix D – Definitions as follows:

29 **no-load reference value.** – A positive **or negative** weight value indication with no load in the load-receiving
30 element of a scale. (~~Used with automatic bulk weighing systems and certain single draft, manually-~~
31 ~~operated receiving hopper scales installed below grade and used to receive grain.~~) [2.20, 2.22]

32 **Background/Discussion:**

33 This item has been assigned to the submitter for further development. For more information or to provide comment,
34 please contact:

35 Mr. Doug Musick
36 Kansas Department of Agriculture
37 785-564-6681, doug.musick@ks.gov

1 There are many devices currently in use that, when not returned to zero, produce an inaccurate weighment. For
2 example, a hopper scale used to weigh aluminum cans. The hoppers of these scales tend to become very sticky from
3 residue and cans may stick to the side. When the indicator does not return to zero the operator will typically re-zero
4 the scale to begin the next weighment. If the operator does not notice the device didn't return to zero, they may pay
5 for the same cans more than once. If the device is re-zeroed with the can still stuck and it is knocked loose later, the
6 customer may be paid for less material than they brought to the facility if the operator does not notice the indicator is
7 below zero. If properly operated, a system utilizing a load-receiving element separate from a weighing element can
8 be used to determine an accurate net weight.

9 In some cases, the load receiving element of a scale will retain materials (in the case of a hopper scale often referred
10 to as the "heel"). This is typically a positive value but if the operator manually re-zero's the indicator and the material
11 is subsequently cleared this can result in a negative value and should be accounted for when determining a net weight.

12 NCWM 2020 Interim Meeting: The submitter (Mr. Musick) stated the intent of this item was directed towards
13 weighing systems utilizing hoppers and tanks and that his understanding of the NIST OWM analysis is that the intent
14 of the proposal may not have been clear and will work towards clarifying the purpose of the item. Mr. Musick
15 requested the committee assign a Developing Status. A representative of the NIST OWM indicated he had discussed
16 the item with the submitter and is willing to work with him to assist in the development of the item.

17 A representative of the SMA commented that their group is opposed to the item because the intent is not understood.

18 During the Committee's work session, the committee assigned this item a Developing status.

19 NCWM 2020 Annual Meeting: Due to the 2020 Covid-19 pandemic, this meeting was adjourned to January 2021, at
20 which time it was held as a virtual meeting. Due to constraint of time, only those items designated as 2020 Voting
21 Items were addressed. All other items were addressed in the subsequent 2021 NCWM Interim Meeting.

22 2021 NCWM Interim Meeting: The Committee heard testimony in the open hearing session from Mr. Loren Minnich
23 (Kansas, submitter) stating that this proposal would replace another proposal from this submitter (ABW-16.1) which
24 the submitter is recommending Withdraw. Mr. Minnich recommended an Information or Developing status for this
25 item. Mr. Russ Vires (SMA) stated that the SMA takes no position on this item. Mr. Kevin Schnepf (California
26 Division of Measurement Standards) supports a Developing status for the item.

27 During the 2021 Interim Meeting work session, the Committee recommended the submitter continue to work with
28 NIST OWM to further develop this item and agreed the item should remain as a Developing status.

29 2022 NCWM Interim Meeting: The committee heard from Loren Minnich (Kansas, submitter) that he requested the
30 item be withdrawn. Russ Vires (SMA) stated they oppose the item and feel it is an application issue. The Committee
31 agreed to withdraw this item.

32 **Regional Association Comments:**

33 WWMA 2021 Annual Meeting: Russell Vires (SMA): carryover item. SMA opposes item in current form. The
34 potential problem is an application issue and not specification issue. Their position is recorded on the NCWM website.

35
36 The WWMA S&T Committee recommends the status remain developmental so that the submitter can continue to
37 work on this as they have previously stated.

38 SWMA 2021 Annual Meeting: Russ Vires, SMA, stated that he opposes this item because he believes its an
39 application issue, not a specifications issue, citing that the submitter has requested it remain developmental.

40
41 This committee recommends this item remain a Developing status.

42 CWMA 2021 Interim Meeting: Loren Minnich-Kansas (submitter) suggested withdraw. Lou Straub-SMA does not
43 support item, feels it's an application issue not a specifications item.

44

1 CWMA S&T Committee supports the submitter request to withdraw.

2 NEWMA 2021 Interim Meeting: During the NEWMA S&T open hearings, no comments were heard, and the
3 submitter was not available.

4
5 The NEWMA Specifications and Tolerances Committee recommends that this item remain in Developing Status.

6 Additional letters, presentation and data may have been submitted for consideration with this item. Please refer to
7 <https://www.ncwm.com/publication-16> to review these documents.

8 **SCL-22.2 A UR.1. Selection Requirements, UR.1.X. Cannabis**

9 **Source:**

10 NCWM Cannabis Task Group

11 **Purpose:**

12 Establish uniform scale suitability requirements among the states for sales of cannabis.

13 **Item Under Consideration:**

14 Amend Handbook 44, Scales Code as follows:

15 **UR.1. Selection Requirements.** Equipment shall be suitable for the service in which it is used with respect to
16 elements of its design, including but not limited to, its capacity, number of scale divisions, value of the scale
17 division or verification scale division, minimum capacity, and computing capability.⁴

18 ...

19 **UR.1.X. Cannabis. – The scale division for scales weighing Cannabis shall not exceed:**

20 (a) **0.01g for net weighments up to capacity,**

21 (b) **0.1g for net weighments greater than 10g, up to capacity, and**

22 (c) **1g for net weighments greater than 100g, up to capacity.**

23 **(Added 20XX)**

24 **Previous Action:**

25 New

26 **Original Justification:**

27 As states legalize sales of cannabis in its various forms, the need has arisen for uniform standards for scale suitability.
28 Uniform requirements from one state to the next, will strengthen each jurisdiction's ability to effectively regulate the
29 industry in a fair and equitable manner. Uniform standards also provide industry with expectations regardless of the
30 jurisdiction, reducing potential conflict or confusion.

31 Some states may already have scale suitability requirements differing for those proposed here. The task group is
32 hopeful that differences can be resolved so that the standards are the same in every jurisdiction:

33 The proposed suitability requirements are based on existing standards as set forth by the California Division of
34 Standards, Division of Measurement Standards.

35 The submitter requested that this item be a Developing Item.

1 **Comments in Favor:**

2 **Regulatory:**

- 3 • 2022 Interim: Several regulatory officials voiced support of continuing to develop this item. The State
4 of Kansas noted that HB44 scale code Table 8 contains “recommended” minimum loads and cannot be
5 used for enforcement. A suggestion was made to use e verification interval (instead of d) for the code
6 application.

7 **Industry:**

- 8 • 2022 Interim: The Scale Manufacturers Association supports developing the item and recommended
9 aligning the item with HB44 Table 8, Recommended Minimum Load.

10 **Advisory:**

- 11 •

12 **Comments Against:**

13 **Regulatory:**

- 14 •

15 **Industry:**

- 16 • 2022 Interim: The Committee heard comments from industry members that do not support this item.
17 An industry member indicated that this proposal is an unprecedented requirement for devices for a
18 specific industry. A&D noted that if the item progresses, they would suggest a minimum scale
19 division of 0.01 g for weighments up to 100 g.

20 **Advisory:**

- 21 • 2022 Interim: NIST OWM reiterated their written analysis of this item and recommends it being
22 considered as a guidance document only. The full analysis can be found on the NCWM website.

23 **Neutral Comments:**

24 **Regulatory:**

- 25 • 2022 Interim: Some regulators voiced concern that this item should apply not only to cannabis but to
26 all commodities that are of high cost.

27 **Industry:**

- 28 •

29 **Advisory:**

- 30 •

31 **Item Development:**

32 NCWM 2022 Interim Meeting: After hearing comments from the floor and referencing submitted supporting
33 documents, the Committee has assigned this item back to the NCWM Cannabis Task Group for further development.
34 The Task Group should consider the several proposals for alternate language that were provided by the regional
35 associations. For more information or to provide comment, please contact:

36 James Cassidy
37 NCWM Cannabis Task Group
38 James.cassidy@mass.gov

Charles Rutherford
NCWM Cannabis Task Group
charlie@cprquaredinc.com

Regional Associations' Comments:

WWMA 2021 Annual Meeting: Josh Nelson (Ex-Officio NCWM S&T Committee) : put forward to address some issues for cannabis, recommend developing - still needs work and continue to work forward. Matt Douglas (California - DMS) : California supports further development, add non retroactive date - subsection A states up to capacity... lists suitability requirements based on California, however, this info is not a standard. Eric Golden (Cardinal Scales) : section A B and C, be better to say 0.1 g for net weighments up to 10 grams, then B 10 to 100 grams, then C say over 100, etc. Kurt Floren (LA County) : Mr. Golden stated perfectly what is lacking. There has to be ranges put in as to where the graduations are appropriate. Erin Sullivan (CO Department of Agriculture) : does this pertain to cannabis in any form or concentration? Josh Nelson (Ex-Officio NCWM S&T Committee) : this is what is going into HB44 - each jurisdiction has to define their own. For Oregon, medical is much different than retail. Retail has to abide by this. Med. Does not. Verbiage in A B and C does need additions. Erin Sullivan (CO Department of Agriculture) : grows vs. dispensaries? Different products in processing facilities are weighed with many containers on the scales. Do states determine the regulation? Josh Nelson (Ex-Officio NCWM S&T Committee) : up to the states to determine how to apply tares and increments in which product is weighed. Kurt Floren (LA County): cannabis products: later we'll see proposed def. of cannabis and cannabis products, are we anticipating the adoption of the proposed language? Josh Nelson (Ex-Officio NCWM S&T Committee) : it is not limited to flowers or bud. Mentions dabs. Is there a packaging requirement for the label? Oregon does. There must be a legal for trade scale that can prove they are meeting net contents. They must ensure that their process is being executed correctly. He thinks this is not limited to flower/bud. Kurt Floren (LA County): this raises the point that further consideration needs to be put into terms. Brownies, cannabis infused pizza.. And other items sold by weight. Are we setting the terms for pure cannabis product or are the scales being used for any cannabis containing product? Josh Nelson (Ex-Officio NCWM S&T Committee) : welcomes written input for this topic from anyone. Josh will continue to develop this. Eric Golden (Cardinal Scales) : clarification on Mr. Nelson: geared towards net sales, packaging for the customer. Is this part of the track and trace program for growers or just for retail? Josh Nelson (Ex-Officio NCWM S&T Committee) : needs to be expanded upon, in Oregon: even the growers have to do track and trace. Any scale weight that is used for the cannabis tracking system needs to be Weights and Measures compliant. Maybe has to address even a class III scale. They will look more into it. Joe Moreo (Ag. Com. Sealer) : over time we are going to need one level for concentrates, one for food, one for flower, one size fits all will not work. Josh Nelson (Ex-Officio NCWM S&T Committee) : Agrees that one size does not fit all. This will start to give limitations as to what a particular weight will be. Not trying to pigeon hole any device into one category, just trying to figure out what works, that's the intent.

The WWMA S&T Committee recommends the item be assigned a developmental status so that the submitter can continue to work on this as they commented during open hearings.

SWMA 2021 Annual Meeting: Russ Vires, SMA, stated that they have no position on this item at this time. Matt Curran, State of Florida, stated that he supports this as a Voting item. He also provided comments in support of this item from Eric Golden, Cardinal Scale. Cardinal offered some changes as well. The suggested changes are as follows:

UR.1.X. Cannabis. – The scale division for scales weighing Cannabis shall not exceed:

- (a) **0.01g for net weighments ~~up to capacity~~ up to 10g,**
- (b) **0.1g for net weighments greater than 10g, up to 100g, ~~capacity, and~~**
- (c) **1g for net weighments greater than 100g, up to capacity.**
(Added 20XX)

Charlie Rutherford, Cannabis Committee, stated that he supports this item moving forward as a voting item with the changes suggested by Cardinal Scale and Dr. Curran.

This committee recommends that this item be moved forward as a Voting item if the changes suggested above are made.

CWMA 2021 Interim Meeting: Loren Minnich-Kansas stated he's not sure of the intent and that it needs more developing. Eric Golden-Cardinal Scales agreed with Loren, is it "e" or "d", will send notes to committee. Ivan Hankins-Iowa would support item with Eric Golden language. Eric Golden continued by recommending the following change to which will add clarity to the listed weight ranges in SCL22.2 (in red)

1 **SCL-22.2 UR.1. Selection Requirements, UR.1.X. Cannabis**

2 **UR.1.X. Cannabis. – The ~~scale division verification scale interval, e, for scales weighing~~**
 3 **Cannabis shall not exceed:**

- 4 (a) **0.01g for net weighments ~~up to capacity up to 10g,~~**
 5 (b) **0.1g for net weighments greater than 10g, up to ~~100g, capacity, and~~**
 6 (c) **1g for net weighments greater than 100g, up to capacity.**
 7 **(Added 20XX)**

8 CWMA S&T Committee recommends as voting item with the proposed changes from Cardinal Scales.

9 NEWMA 2021 Interim Meeting: Eric Golden (Cardinal Scale)- Made suggestions to change the language in this item
 10 to the following:

- 11 UR.1.X Cannabis.....
 12 (a) 0.01g for net weighments up to 10 g
 13 (b) 0.1g for net weighments greater than 10g , up to 100 g, and
 14 (c) 1 g for net weighments greater than 100g , up to capacity

15 Lou Sakin (Hopkinton/Northbridge, MA) commented that he agrees with changes above.

16 Discussions were heard regarding the agreement with table 8 in scale code as this requirement is more restrictive than
 17 table 8 parameters. Eric Golden (Cardinal Scale) commented that national uniformity would be good and many states
 18 have informational publications that outline requirements in their state for Cannabis scale requirements. Jimmy
 19 Cassidy (MA) recommends voting status with the changes above. Matt Curran (FL) commented that harmonization
 20 with table 8 would be a good idea if possible. Lou Sakin (Hopkinton/Northbridge, MA) questioned if Cannabis should
 21 be in *italics*. The Committee suggests making the change to italics for *Cannabis*.
 22

23 The NEWMA Specifications and Tolerances Committee recommends that this item be given Voting Status with
 24 suggested edits.

CWMA Report: SCL-22.2	
Regional recommendation to NCWM on item status:	
<input type="checkbox"/> Recommend as a Voting Item on the NCWM agenda <input type="checkbox"/> Recommend as an Information Item on the NCWM agenda <input checked="" type="checkbox"/> Recommend as an Assigned Item on the NCWM agenda <i>(To be developed by an NCWM Task Group or Subcommittee)</i> <input type="checkbox"/> Recommend as a Developing Item on the NCWM agenda <i>(To be developed by source of the proposal)</i> <input type="checkbox"/> Recommend Withdrawal of the Item from the NCWM agenda <i>(In the case of new proposals, do not forward this item to NCWM)</i> <input type="checkbox"/> No recommendation from the region to NCWM <i>(If this is a new proposal, it will not be forwarded to the national committee by this region)</i>	
Comments and justification for the regional recommendation to NCWM: (This will appear in NCWM reports)	
Doug Musick – KS – Welcomed the attempt to define suitability; Recommended the following: <i>SCL-22.2 UR.1. Selection Requirements, UR.1.X. Cannabis</i> <i>UR.1.X. Cannabis. – A retail Cannabis scale shall not be used to weigh net loads smaller than 100 displayed scale divisions “d”,</i> <i>(a) 0.01g for net weighments 10g or less,</i> <i>(b) 0.1g for net weighments greater than 10g and up to 100g, and</i> <i>(c) 1g for net weighments greater than 100g.</i> <i>(Added 20XX)</i> Russ Vires – SMA – The addition of a User Requirement is not the best approach in this situation; User	

Requirements do not typically apply to a specific commodity. Supports continuing as developing and the following proposed changes should be considered instead:

- The words “retail cannabis” should be added to the “Class II” section of Table 7a.
- The words “bulk cannabis processing and sales” should be added to the “Class III” section of Table 7a.

Charlie Stutesman – KS – Questions why only metric units are referenced and not also include inch-pound units. The CWMA S&T Committee recommends this item remain with the NCWM Cannabis Task Group and that the suggested changes are considered.

1
2 Additional letters, presentation and data may have been submitted for consideration with this item. Please refer to
3 <https://www.ncwm.com/publication-16> to review these documents.

4 **LMD – LIQUID MEASURING DEVICES**

5 **LMD-21.1 V Table S.2.2. Categories of Device and Method of Sealing**

6 **Source:**
7 Gilbarco, Inc.

8 **Purpose:**
9 To modify Category 3 requirements under Methods of Sealing to allow electronic copy of event logger for liquid
10 measuring devices. To enhance or have alternate wording to existing Item LMD-20.1 under review for this item.

11 **Item Under Consideration:**
12 Amend Handbook 44, Liquid Measuring Devices Code as follows:

<i>Table S.2.2. Categories of Device and Methods of Sealing</i>	
<i>Categories of Device</i>	<i>Methods of Sealing</i>
<i>Category 1: No remote configuration capability.</i>	<i>Seal by physical seal or two event counters: one for calibration parameters and one for configuration parameters.</i>
<i>Category 2: Remote configuration capability, but access is controlled by physical hardware.</i> <i>The device shall clearly indicate that it is in the remote configuration mode and record such message if capable of printing in this mode or shall not operate while in this mode.</i>	<i>[The hardware enabling access for remote communication must be on-site. The hardware must be sealed using a physical seal or an event counter for calibration parameters and an event counter for configuration parameters. The event counters may be located either at the individual measuring device or at the system controller; however, an adequate number of counters must be provided to monitor the calibration and configuration parameters of the individual devices at a location. If the counters are located in the system controller rather than at the individual device, means must be provided to</i>

	<p><i>generate a hard copy of the information through an on-site device.]*</i></p> <p><i>[*Nonretroactive as of January 1, 1996]</i></p>
<p>Category 3: <i>Remote configuration capability access may be unlimited or controlled through a software switch (e.g., password).</i></p> <p><i>[Nonretroactive as of January 1, 1995]</i></p> <p><i>The device shall clearly indicate that it is in the remote configuration mode and record such message if capable of printing in this mode or shall not operate while in this mode.</i></p> <p><i>[Nonretroactive as of January 1, 2001]</i></p>	<p>An event logger is required in the device; it must include an event counter (000 to 999), the parameter ID, the date and time of the change, and the new value of the parameter. A printed copy of the information must be available on demand through the device or through another on site device. The information may also be available electronically. <u>The event logger information shall be available at the time of inspection either as a printed copy or in electronic format. The information may be printed by the device, printed by another on site device, or transmitted electronically.</u> The event logger shall have a capacity to retain records equal to 10 times the number of sealable parameters in the device, but not more than 1000 records are required. (Note: Does not require 1000 changes to be stored for each parameter.)</p>

[Nonretroactive as of January 1, 1995]
 (Table Added 1993) (Amended 1995, 1998, 1999, 2006, and 2015)

1 **Original Justification:**

2 Current requirement is that category 3 device must have printed copy made available on site for the event logger
 3 information. Category 3 devices are fully connected electronic devices here in the modern age and thus we need to
 4 move away from the archaic requirement of only allowing a paper copy for this item. The industry fully supports this
 5 change. LMD’s have many types of regulatory events that accumulate in the event logger: blend ratio changes,
 6 calibration changes for the meters, SW downloads are examples. Often our only available print option is through the
 7 device receipt printer. With its tiny width of receipt paper, the event log for an older liquid measuring device will be
 8 several feet long and have text that wraps and is difficult to read. Allowing an electronic copy will be more convenient,
 9 easily read, and easily saved/retained/shareable.

10 Wayne Fueling Systems, LLC had a current proposal, Item LMD-20.1 for this item and in discussion with him he has
 11 been very supportive of me providing alternate wording above for consideration, or possibly to use in place of his
 12 proposal. Hopefully we can hear from Wayne Fueling Systems on this in the upcoming meetings. Also, I am aware
 13 of the Electric vehicle charger industry is working on this item to propose allow electronic copy as well.

14 The submitter requested voting status for this item in 2021.

15 **Previous Action:**

- 16
 - 2021: Developing Item

1 **Comments in Favor:**

2 **Regulatory:**

- 3 • Charlie Stutsman (Kansas) and Matt Douglas (California) supported the item as a voting item

4 **Industry:**

- 5 • Brent Price (Gilbarco rose in support of the item and encouraged making the item have a voting status.
6 Dmitri Karimov (MMA) stated the industry group was in favor of the item.
7 • Randy Moses (Wayne Fueling Systems LLC), the submitter of Item LMD-20.1, agreed to withdraw his
8 proposal in favor of this item and will work with the submitter of this item to further develop it. Both
9 companies support electronic logs for Category 3 sealing requirements.

10 **Advisory:**

- 11 • Written comments were provided by NIST OWM.
12 • Ms. Diane Lee (NIST OWM) noted that there is a similar proposal on the S&T agenda, Item EVF-21.4
13 that the committee may want to consider when discussing this item and that OWM agrees with a
14 developing status for this item.

15 **Comments Against:**

16 **Regulatory:**

- 17 •

18 **Industry:**

- 19 •

20 **Advisory:**

- 21 •

22 **Neutral Comments:**

23 **Regulatory:**

- 24 •

25 **Industry:**

- 26 •

27 **Advisory:**

- 28 •

29 **Item Development:**

30 The Committee agreed at the 2021 Interim Meeting to withdraw LMD-20.1. The Committee agreed on a Developing
31 status for LMD-21.1

32 This item has been assigned to the following persons for further development. For more information or to provide
33 comment, please contact:

Mr. Brent Price
Gilbarco Inc.
336-547-5009, brent.price@gilbarco.com

Mr. Randy Moses
Wayne Fueling Systems, LLC
215-257-2759

34 NCWM 2022 Interim Meeting: During the committee work session, the committee determined to recommend a voting
35 status for this item based on the supporting comments made in open hearings.

1 **Regional Associations' Comments:**

2 WWMA 2021 Annual Meeting: Brent Price (Gilbarco): submitter: to modify event logger for cat. 3 devices - will
 3 allow electronic copy be available to W/M and not just hard copy. Worked with Wayne to develop this, conferenced
 4 with NIST and they are supportive. EV systems allows for this. We ask to allow LMD allow this (like EV). Has
 5 support of industry. Wants to consider this for voting status.

6 The WWMA S&T Committee recommends this item be assigned a Voting status.

7 SWMA 2021 Annual Meeting: Brent Price, Gilbarco, who is the submitter of this item, stated that the EVF code was
 8 recently changed to allow electronic copies of the event logger, and that he supports moving this forward as a Voting
 9 Item. Tim Chesser, Arkansas, supports moving this forward as a Voting Item.

10 This committee recommends moving this item forward as a Voting Item.

11 CWMA 2021 Interim Meeting: The committee heard comments from the floor. Diane Lee-NIST this item is ready to
 12 move forward as a voting or remain developing item. Charles Stutesman-Kansas item is read for vote.
 13

14 CWMA S&T Committee recommends that the item move forward as voting.

15 NEWMA 2021 Interim Meeting: Jim Willis (New York) and John McGuire (New Jersey) commented to recommend
 16 voting status.

17 The NEWMA Specifications and Tolerances Committee recommends that this item be given Voting Status.

CWMA Report: LMD-21.1
<p>Regional recommendation to NCWM on item status:</p> <ul style="list-style-type: none"> <input checked="" type="checkbox"/> Recommend as a Voting Item on the NCWM agenda <input type="checkbox"/> Recommend as an Information Item on the NCWM agenda <input type="checkbox"/> Recommend as an Assigned Item on the NCWM agenda <i>(To be developed by an NCWM Task Group or Subcommittee)</i> <input type="checkbox"/> Recommend as a Developing Item on the NCWM agenda <i>(To be developed by source of the proposal)</i> <input type="checkbox"/> Recommend Withdrawal of the Item from the NCWM agenda <i>(In the case of new proposals, do not forward this item to NCWM)</i> <input type="checkbox"/> No recommendation from the region to NCWM <i>(If this is a new proposal, it will not be forwarded to the national committee by this region)</i>
<p>Comments and justification for the regional recommendation to NCWM: <i>(This will appear in NCWM reports)</i></p> <p>Brent Price – Gilbarco - On behalf of Gilbarco and industry, appreciate the support to allow electronic format for event logger. Printed copy on site is difficult when the system doesn't contain printers. Taxi meters and EVSE allow digital versions of event logger. The CWMA S&T Committee recommends this item to remain a voting item.</p>

18 Additional letters, presentation and data may have been submitted for consideration with this item. Please refer to
 19 <https://www.ncwm.com/publication-16> to review these documents.

20 **LMD-22.1 V Table T.2. Accuracy Classes and Tolerances for Liquid Measuring Devices**
 21 **Covered in NIST Handbook 44, Section 3.30**

22 **Source:**
 23 NTEP Measuring Sector

1 **Purpose:**
 2 To correct an inconsistency between the application of tolerances to smaller capacity Diesel Exhaust Fluid (DEF)
 3 measuring systems and retail motor-fuel dispensers.

4 **Item Under Consideration:**
 5 Amend Handbook 44, Liquid-Measuring Devices Code as follows:

Table T.2.				
Accuracy Classes and Tolerances for Liquid Measuring Devices Covered in				
NIST Handbook 44, Section 3.30.				
Accuracy Class	Application	Acceptance Tolerance	Maintenance Tolerance	Special Test Tolerance¹
0.3	- Petroleum products delivered from large capacity (flow rates greater than 115 L/min or 30 gpm)** devices, including motor-fuel devices - Heated products (other than asphalt) at temperatures greater than 50 °C (122 °F) - Asphalt at temperatures equal to or below 50 °C (122 °F) - All other liquids not shown in the table where the typical delivery is over 200 L (50 gal)	0.2 %	0.3 %	0.5 %
0.3A	- Asphalt at temperatures greater than 50 °C (122 °F)	0.3 %	0.3 %	0.5 %
0.5*	- Petroleum products delivered from small capacity (at 4 L/min (1 gpm) through 115 L/min or 30 gpm)** motor-fuel devices - Agri-chemical liquids - All other applications not shown in the table where the typical delivery is ≤ 200 L (50 gal)	0.3 %	0.5 %	0.5 %
1.1	- Petroleum products and other normal liquids from devices with flow rates** less than 1 gpm. - Devices designed to deliver less than 1 gal	0.75 %	1.0 %	1.25 %
* For test drafts ≤ 40 L or 10 gal, the tolerances specified for Accuracy Class 0.5 in the table above do not apply. For these test drafts, the following applies: (a) Maintenance tolerances on normal and special tests shall be 20 mL plus 4 mL per indicated liter or 1 in ³ plus 1 in ³ per indicated gallon. (b) Acceptance tolerances on normal and special tests shall be one-half the maintenance tolerance values. ¹ Special test tolerances are not applicable to retail motor fuel and retail DEF dispensers. ** Flow rate refers to designed or marked maximum flow rate.				

(Added 2002) (Amended 2006 and 2013)

6 **Previous Action:**
 7 New

1 **Original Justification:**

2 During the review of NTEP requirements related to DEF dispensing systems, the NTEP Measuring Sector observed
3 an inconsistency between the application of tolerances for retail motor-fuel dispensers (RMFDs) and for small capacity
4 DEF measuring systems.

5 Smaller capacity DEF measuring systems use measuring equipment nearly identical to that used for RMFD
6 applications and the NCWM and NTEP have agreed in past discussions that these two applications should be addressed
7 consistently. Changes were made to NIST Handbook 44 in 2019 to more closely align requirements for RMFDs and
8 smaller capacity DEF measuring systems; for example, paragraph N.4.2.2. Retail Motor-Fuel Devices and DEF, which
9 specifies identical special test procedures for both systems. However, Table T.2. Accuracy Classes and Tolerances
10 for Liquid-Measuring Devices Covered in NIST Handbook 44, includes an inconsistency in the application of
11 tolerances for the “special test” for these two applications

12 It was judged during the Measuring Sector’s review that, based upon the application flow rates, without the note a
13 DEF dispenser would be given a different tolerance for special tests than would RMFDs.

14 The proposed change to Footnote 1 will correct the oversight made when DEF dispensers were added to requirements
15 in alignment with retail motor-fuel devices.

16 The submitter requested that this be a Voting item in 2022.

17 **Comments in Favor:**

18 **Regulatory:**

- 19 • Charlie Stutesman (Kansas) spoke wanting to make sure we were talking about DEF dispensers used at
20 a retail establishment.
- 21 • Doug Musick (Kansas) suggested adding the word “Retail’ in front of DEF.
- 22 • Cadence Matijevich (Nevada) Stated support as voting item with the addition of the word retail.
- 23 • Matt Douglas (California) and Tim Chesser (Arkansas) added their support of a voting item with the
24 addition of the word “retail”.

25 **Industry:**

- 26 • Michael Keilty (Endress + Hauser) felt there was some inconsistency where Table T.2. Special
27 tolerances are not applicable to RMFD and do not include DEF Dispensers. NTEP does not test with
28 special test and supports item as voting.
- 29 • Brent Price (Gilbarco) Stated support of item as voting, including that DEF dispensers were
30 manufactured to meet the RMFD standards.

31 **Advisory:**

- 32 •

33 **Comments Against:**

34 **Regulatory:**

- 35 •

36 **Industry:**

- 37 •

38 **Advisory:**

- 39 •

1 **Neutral Comments:**

2 **Regulatory:**

- 3 •

4 **Industry:**

- 5 •

6 **Advisory:**

- 7 •

8 **Item Development:**

9 The committee recommends the item under consideration be given a voting status with the addition of the word “retail”
 10 in front of DEF to add clarity to the code.

11 **Regional Associations’ Comments:**

12 This item was submitted by the NTEP Measuring Sector prior to the November 1 deadline, but not in time for regional
 13 consideration.

CWMA A Report: LMD-22.1
<p>Regional recommendation to NCWM on item status:</p> <p><input checked="" type="checkbox"/> Recommend as a Voting Item on the NCWM agenda</p> <p><input type="checkbox"/> Recommend as an Information Item on the NCWM agenda</p> <p><input type="checkbox"/> Recommend as an Assigned Item on the NCWM agenda <i>(To be developed by an NCWM Task Group or Subcommittee)</i></p> <p><input type="checkbox"/> Recommend as a Developing Item on the NCWM agenda <i>(To be developed by source of the proposal)</i></p> <p><input type="checkbox"/> Recommend Withdrawal of the Item from the NCWM agenda <i>(In the case of new proposals, do not forward this item to NCWM)</i></p> <p><input type="checkbox"/> No recommendation from the region to NCWM <i>(If this is a new proposal, it will not be forwarded to the national committee by this region)</i></p>
<p>Comments and justification for the regional recommendation to NCWM: <i>(This will appear in NCWM reports)</i></p> <p>Michael Keilty – Endress+Hauser, Chair of NTEP Measuring Sector - Possibility of confusion that would allow retail DEF dispensers to have a different tolerance. Recommend moving forward as voting item.</p> <p>Brent Price – Gilbarco - Supports the item. When DEF dispensers were built, they built them along the same guidelines as RMFD. This provides clarity.</p> <p>The CWMA S&T Committee recommends this item to remain a voting item.</p>

14

15 Additional letters, presentation and data may have been submitted for consideration with this item. Please refer to
 16 <https://www.ncwm.com/publication-16> to review these documents.

17 **VTM – VEHICLE TANK METERS**

18 **VTM-18.1 V S.3.1 Diversion of Measured Liquid and S.3.1.1. Means for Clearing the**
 19 **Discharge Hose and UR.2.6. Clearing the Discharge on a multiple-product,**
 20 **single discharge hose.**

21 *NOTE: At the 2020 Interim Meeting the Committee agreed to combine both VTM-18.1 and VTM-20.1. Both items*
 22 *are now one item under VTM-18.1*

1 **Source:**

2 New York and NIST OWM (Carryover from 2018, VTM 1-B) and Murray Equipment, Inc., Total Control Systems

3 **Purpose:**

4 Provide specifications and user requirements for manifold flush systems on a multiple-product, single-discharge hose.
5 Recognize that there is a balance between a mechanism that provides an important safety benefit but also, if used
6 incorrectly, facilitates fraud. Ensure that VTM owners understand their responsibilities when installing such a system
7 and ensure uniformity in enforcement throughout the country and clarify the paragraph to protect vehicle motor fuel
8 quality, retain safe operating procedures when handling vehicle motor fuels, and to prevent fraud during delivery of
9 vehicle motor fuels from vehicle tank meters.

10 **Item Under Consideration:**

11 Amend Handbook 44, Vehicle-Tank Meters Code as follows:

12 Amend Handbook 44, Vehicle-Tank Meters Code as follows:

13 **S.3.1. Diversion of Measured Liquid.** – No means shall be provided by which any measured liquid can be diverted
14 from the measuring chamber of the meter or the discharge line thereof. However, two or more delivery outlets may
15 be installed if means are provided to ensure that:

- 16 (a) liquid can flow from only one such outlet at one time; and
17 (b) the direction of flow for which the mechanism may be set at any time is definitely and conspicuously
18 indicated.

19 This paragraph does not apply to the following:

- 20 (1) Equipment used exclusively for fueling aircraft.
21 (2) Multiple-product, single-discharge hose metering systems that are equipped with systems designed
22 to flush the discharge hose, provided the flushing system complies with the provisions of paragraph
23 S.3.1.1. Means for Clearing the Discharge Hose, **Multiple-Product, Single-Discharge Hose**
24 **Metering Systems.**

25 (Amended 2018 **and 20XX**)

26 **S.3.1.1. Means for Clearing the Discharge Hose, Multiple-Product, Single-Discharge Hose Metering**
27 **Systems. - Multiple-product, single-discharge hose M**metering systems may be equipped with systems
28 specifically designed to facilitate clearing of the discharge hose prior to delivery to avoid product
29 contamination. In such systems. a valve to temporarily divert product from the measuring chamber of the
30 meter to a storage tank, shall be installed only if all the following are met:

- 31 (a) the discharge hose remains of the wet-hose type;
32 (b) the valve and associated piping are approved by the weights and measures authority having
33 jurisdiction over the device prior to commercial use;
34 (c) the valve is permanently marked with its purpose (e.g. flush valve);
35 (d) the valve is installed in a conspicuous manner and as far from the hose reel as practical;
36 (e) the system clearly and automatically indicates the direction of product flow during operation of the
37 flush system; and

1 (f) clear means, such as an indicator light or audible alarm, is used to identify when the valve is in use
2 on both quantity indications and any associated recorded representations (e.g., using such terms
3 as “flushing mode” or “not for commercial use”);
4 [nonretroactive as of January 1, 2024.]

5 (g) effective, automatic means shall be provided to prevent passage of liquid through any such flush
6 system during normal operation of the measuring system; and
7 [nonretroactive as of January 1, 2024.]

8 (h) no hoses or piping are connected to the inlet when it is not in use.
9 (Added 2018)(Amended 20XX)

10 **UR.2.6. Clearing the Discharge Hose.**

11 **UR.2.6.1. Clearing the Discharge Hose, General. – A manifold flush or similar system designed to**
12 **accommodate the flushing of product on single-hose, multiple-product systems is not to be used during**
13 **a commercial transaction. The following restrictions apply:**

- 14 a) The inlet valves for the system are not to be connected to any hose or piping (dust covers are
15 permitted) when not in use.
- 16 b) When the flushing system is in operation, the discharge hose is only to be connected to the port
17 for the product type being flushed from the discharge line.
- 18 c) Following the flushing process, indications and recording elements must be reset to zero prior
19 to beginning a commercial delivery.
20 (Added 20XX)

21 **UR.2.6.2. Minimizing Cross Contamination. – When dissimilar products are dispensed through a**
22 **single meter, the user shall take steps to ensure the system is properly flushed to minimize the potential**
23 **for cross contamination of product in receiving tanks on subsequent deliveries. Dispensing products**
24 **having radically different characteristics (e.g., gasoline and diesel fuel) through a single meter delivery**
25 **system is not recommended.**
26 **(Added 20XX)**

27
28 **UR.2.6.3. Records.** Whenever, prior to delivery, a different product is pumped through the discharge hose
29 to avoid contamination, a record including the date, time, original product, new product, and gallons pumped
30 shall be maintained. These records shall be kept for a period of 12 months and available for inspection by the
31 weights and measures authority.
32 (Added 2018)

33 **Background/Discussion:**

34 This item has been assigned to the submitter for further development. For more information or to provide comment,
35 please contact:

36 Mr. Jim Willis
37 New York Department of Agriculture and Markets
38 518-485-8377, james.willis@agriculture.ny.gov

39 This item was one of two separate parts of VTM-1 (previously VTM-1A and VTM-1B) considered by the Committee
40 at the 2018 NCWM Annual Meeting. The item voted on at the 2018 Annual Meeting, VTM-1A was adopted and
41 VTM-1B was assigned an Informational status and carried-over to the next cycle.

1 Manifold flush systems are typically used on VTM's with multiple compartments, delivering multiple products
2 through a single hose. The purpose of the system is to allow the driver a means of clearing the hose of product prior
3 to delivery (e.g., clearing the hose of diesel fuel before delivering clear kerosene). These types of systems are often
4 marketed as a safety feature in that it eliminates the need for the driver to climb on top of the truck to clear the hose.
5 Such systems are also useful in helping avoid cross-contamination. Typically, the driver attaches the nozzle to the
6 manifold and pumps product back into the supply tank via the manifold until the previous product is flushed from the
7 hose. There is often a sight gauge which allows the driver to tell when the product is flushed.

8 The obvious concern is that this makes it very easy for the driver to circulate product through the meter prior to
9 delivery, which goes against S.3.1. It should be noted that it also goes against S.3.1. when the driver climbs on top of
10 the tanker and clears the hose. The submitter has voiced concerns involving the safety of this practice noting that the
11 operator could be subject to falls from the tanker. The distance between the flush system and the hose reel is also a
12 factor in how easy it is for the driver to facilitate fraud.

13 Manifold flush systems are available from OEMs and can be found in various catalogs. Looking on multiple websites,
14 these systems are being installed across the country and for some manufacturers seem to be standard equipment for
15 new trucks. The submitter of VTM-1 has also seen these systems installed on trucks that are for sale where the seller
16 notes the system as a selling point. He can foresee these systems being mandated in the future as a safety requirement
17 and would like W&Ms to have a clear policy before that happens.

18 Another concern is with systems fabricated onsite. These systems are often difficult to distinguish and installed in an
19 inconspicuous manner. While the submitter of VTM-1 has ordered many of these systems out-of-service until
20 repaired, it can be frustrating for the owner because the truck was used in another state for years and approved by
21 weights and measures jurisdiction in the other state. This lack of uniformity is problematic for both officials and
22 private industry.

23 NCWM 2018 Annual Meeting: The Committee heard comments from OWM that this item needed additional work
24 to address concerns that had been identified in OWM's 2018 Interim Meeting (and earlier) analyses. While there are
25 clear benefits to improving safety when flushing hoses, OWM and others have noted these systems can facilitate fraud
26 without appropriate safeguards in place. OWM noted the language in the Item Under Consideration in the
27 Committee's 2018 Interim Report would:

- 28 1. provide an (unintentional) exemption to the provisions for "diversion of product" for *all* single meter,
29 multiple product, multiple compartment systems;
- 30 2. would (unintentionally) require all such systems to be equipped with a manifold flush system;
- 31 3. fail to include requirements for the system to clearly indicate (on both display and recorded representations)
32 when the flush system is in operation; and
- 33 4. fail to include limitations on how the user is permitted to appropriately use these systems.

34 In discussing the changes OWM felt were needed prior to the Annual Meeting, the submitter and OWM agreed that
35 some of OWM's proposed changes would be considered editorial and others technical in nature. Since other than
36 editorial changes could affect the Voting status of the item, OWM offered the following two courses of action for the
37 Committee to consider:

- 38 1. Downgrade the item to Informational to allow time to address all the changes that are needed; or
- 39 2. Split the item into two parts to allow the portion of the item needing only editorial changes to move forward
40 for vote; and carryover the remaining portion to allow time for it to be further developed and considered
41 during the next NCWM cycle.

42 Rather than hold up the entire item to be considered in the next Conference cycle, the submitter requested the item be
43 split into two parts to allow the completed portion, including the editorial changes, to move forward for vote.

1 NCWM 2019 Interim Meeting: The Committee heard comments to Agenda Item VTM-1 as well as position
 2 statements from MMA that they objected to manifold flush systems. NIST OWM provided an analysis to the
 3 Committee prior to the Interim Meeting. The comments heard during the open hearing and/or received prior to the
 4 Interim meeting are summarized below:

5 Mr. Hal Prince (FL) stated that it was missing any inclusion for limitation of use, such as when delivering multiple
 6 products. Mr. Prince suggested that the Committee consider language forwarded by the SWMA in its 2018 Annual
 7 Report. Mr. Prince also suggested that the item be kept developmental. Mr. Dan Murray (Murray Equipment, Total
 8 Controls System) stated that Manifold Flush Systems were a big problem in Europe where they are permitted. Mr.
 9 Murray suggested these systems could facilitate fraud and NTEP should carefully consider this before granting
 10 approval. These systems should also be sealed. Mr. Murray’s opinion was that the item should be withdrawn. Mr.
 11 Dmitri Karimov speaking on behalf of Meter Manufacturers Association, stated that MMA objected to manifold flush
 12 systems.

13 NIST OWM agreed with the WWMA and the CWMA that this item is fully developed and agreed with assigning it a
 14 voting status. OWM provided the following review of the operation of the equipment, proposed changes, and
 15 additional points to consider:

- 16 • At the 2018 NCWM Annual Meeting the Conference voted to allow an exemption to S.3.1. for Manifold
 17 Flush Systems, which is currently in the 2019 HB 44 VTM code.
- 18 • S.3.1. states “no means” shall be provided to divert liquid from the measuring chamber of the meter or the
 19 discharge line.
- 20 • A manifold flush system allows liquid to be diverted from the discharge line on single hose multi-
 21 compartment VTMs so that liquid of one product is not mixed with liquid of another in the discharge line.
- 22 • Without a manifold flush system, the operator must manually return the product to the correct compartment
 23 to clear the discharge line before using another product.
- 24 • There are safety hazards with manually returning the product to storage (operator climbing on top of tank
 25 and lifting hose to return the product. There are also safety concerns when not properly clearing the discharge
 26 lines prior to delivering a different product and because of these safety concerns it was reported that more of
 27 these systems will likely be installed on single hose multicompartment trucks.
- 28 • Although safety is a high priority, the “means” used to return product back to storage is not as visible and
 29 makes facilitation of fraud a high possibility.
- 30 • The additional changes proposed are intended to ensure such systems are designed such that they do not
 31 facilitate fraud; help ensure owners understand their responsibilities when installing such a system; and
 32 ensure uniformity in enforcement though out the country.
- 33 • The changes reflect the suggested language from OWM’s previous analysis and incorporate comments
 34 received from the MMA and others during the 2018 Annual meeting.

35 Non-retroactive dates may need to be added to allow time for manufacturers of flush systems to incorporate the
 36 safeguards into their systems. During the committee’s work session, the Committee considered the comments
 37 received during the Interim Meeting open hearings and recommended a voting status for this item.

38 NCWM 2019 Annual Meeting: The Committee supported amendments proposed to subparts (f) and (g) based upon
 39 statements from the submitter (NY) indicating that manufacturers of manifold flush systems will need additional time
 40 to incorporate the safeguards into their systems. The Committee also agreed to place the item on the voting consent
 41 calendar as amended, and as shown in the Item Under Consideration.

CWMA S&T 2022 Annual Meeting Report

1 During the open hearing sessions, the Committee heard comments from NIST OWM's Mrs. Tina Butcher offering a
2 revision of S.3.1.1.(f), suggesting this portion be split into separate bullet points. Also heard were comments from
3 Mr. Jim Willis (NY) in support of NIST OWM's suggestion and his recommendation for making this a nonretroactive
4 requirement to allow manufacturers time to accommodate the necessary changes.

5 During the voting session, it was requested this item be removed from the voting consent calendar and voted on
6 separately. The item failed to receive enough votes for adoption and was therefore returned to the Committee.

7 NCWM 2020 Interim Meeting: The Committee heard from Ms. Butcher (NIST OWM) who recommended that VTM-
8 18.1 and VTM-20.1 be combined because both items address manifold flush systems, but VTM 18-1 does not restrict
9 the use of the system to certain products and VTM 20-1 restricts the use of the system to home heating fuel. Mrs.
10 Butcher recommended that the combined item be given a developing status to address the design and use of these
11 systems adequately. Mrs. Butcher also recommended improvements to VTM 18-1 and VTM 20-1.

12 Mr. Dmitri Karimov (MMA) agreed with the language proposed in VTM 18-1 and acknowledged that there is value
13 in the alternative proposal VTM-20.1 and supports combining both proposals into one. Mr. Hal Prince (FL) also
14 agreed that Item VTM-18.1 and VTM-20.1 be combined and given a developing status. Mr. Prince expressed a
15 willingness to work with submitters to further develop the items and noted that he has concerns with cross-
16 contamination caused by these systems. Mr. Jim Willis agreed with Mrs. Butcher's statements. Mr. Karimov
17 recommended including more categories for types of fuels in the proposal is important such as flammable, explosive,
18 etc. Mr. John Hathaway (Murray Equipment) submitter of VTM-20.1 expressed interest in working together with the
19 submitters of VTM-18.1.

20 During the Committee's work session, the committee agreed that this item, VTM-18.1 should be combined with VTM-
21 20.1 and be given a developing status to allow the submitters of both items to work together towards resolving the
22 conflicts in these two items.

23 NCWM 2020 Annual Meeting: Due to the 2020 Covid-19 pandemic, this meeting was adjourned to January 2021, at
24 which time it was held as a virtual meeting. Due to constraint of time, only those items designated as 2020 Voting
25 Items were addressed. All other items were addressed in the subsequent 2021 NCWM Interim Meeting.

26 NCWM 2021 Interim Meeting: The Committee heard from Mr. Mike Smith (NY) who supports VTM 18.1 as a
27 Developing item and he agreed to work with the other submitters of this item on paragraphs S.3.1.1. (f) and (g) and to
28 address contamination. Mr. Hal Prince (FL) supports a Developing status for VTM-18.1 and noted that with VTM-
29 18.1 there will be issues with fuel contamination. The concern raised in previous discussions was that if these manifold
30 systems are used with multi-product, single discharge hose dispensers for the delivery of both motor fuels and home
31 heating fuels, a small amount of home heating fuel mixed with a motor fuel could be problematic. It was also noted
32 that these fuels could get contaminated repeatedly whenever there is a change from one fuel to another and that there
33 is also the safety issue of flashing when mixing a gasoline with diesel or kerosene. Ms. Diane Lee report that VTM-
34 18.1 and VTM-20.1 conflict. VTM-20.1 restricts the use of these systems to be used with only home heating fuels.
35 Dmitri Karimov (MMA) noted if VTM-18.1 is adopted then VTM-20.1 would not be required. Mr. Charles
36 Stutesman, (KS) was not sure if VTM-18-1 and VTM-20-1 were being discussed together and it was pointed out that
37 it was agreed that they be combined at the 2020 interim meeting. Mr. John Hathaway (Total Control Systems) agreed
38 with a Developing status for this item and noted that the changes to Paragraphs (f) and (g) would help to address some
39 of the issues that were raised. The committee agreed to a Developing status for VTM-18.1 and to Withdraw VTM-
40 20.1. The committee also stated that any concerns with contamination and safety should also be addressed.

41 NCWM 2021 Annual Meeting: Mr. Jim Willis (NY, submitter) reported that there are no updates due to the pandemic
42 and requested that it remain under Developing status. NIST OWM included written comments in its analysis.

43 NCWM 2022 Interim Meeting:

44 Item under consideration presented to 2022 NCWM Interim meeting as:

1 **S.3.1. Diversion of Measured Liquid.** – No means shall be provided by which any measured liquid can be diverted
2 from the measuring chamber of the meter or the discharge line thereof. However, two or more delivery outlets may
3 be installed if means are provided to ensure that:

- 4 (b) liquid can flow from only one such outlet at one time; and
- 5 (b) the direction of flow for which the mechanism may be set at any time is definitely and conspicuously
6 indicated.

7 This paragraph does not apply to the following:

- 8 (2) Equipment used exclusively for fueling aircraft.
- 9 (2) Multiple-product, single-discharge hose metering systems that are equipped with systems designed
10 to flush the discharge hose, provided the flushing system complies with the provisions of paragraph
11 S.3.1.1. Means for Clearing the Discharge Hose, **Multiple-Product, Single-Discharge Hose**
12 **Metering Systems.**

13 (Amended 2018 **and 20XX**)

14 **S.3.1.1. Means for Clearing the Discharge Hose, Multiple-Product, Single-Discharge Hose Metering**
15 **Systems. - Multiple-product, single-discharge hose M**metering systems may be equipped with systems
16 specifically designed to facilitate clearing of the discharge hose prior to delivery to avoid product
17 contamination. In such systems. a valve to temporarily divert product from the measuring chamber of the
18 meter to a storage tank, shall be installed only if all the following are met:

- 19 (i) the discharge hose remains of the wet-hose type;
- 20 (j) the valve and associated piping are approved by the weights and measures authority having
21 jurisdiction over the device prior to commercial use;
- 22 (k) the valve is permanently marked with its purpose (e.g. flush valve);
- 23 (l) the valve is installed in a conspicuous manner and as far from the hose reel as practical;
- 24 (m) the system clearly and automatically indicates the direction of product flow during operation of the
25 flush system; and
- 26 (n) clear means, such as an indicator light or audible alarm, is used to identify when the valve is in *use*
27 **on both quantity indications and any associated recorded representations (e.g., using such terms**
28 **as “flushing mode” or “not for commercial use”);**
29 **[nonretroactive as of January 1, 2024.]**
- 30 (o) **effective, automatic means shall be provided to prevent passage of liquid through any such flush**
31 **system during normal operation of the measuring system; and**
32 **[nonretroactive as of January 1, 2024.]**
- 33 (p) no hoses or piping are connected to the inlet when it is not in use.

34 (Added 2018)(**Amended 20XX**)

35 **UR.2.6. Clearing the Discharge Hose.**

36 **UR.2.6.1. Clearing the Discharge Hose, General. – A manifold flush or similar system designed to**
37 **accommodate the flushing of product on single-hose, multiple-product systems is not to be used during**
38 **a commercial transaction. The following restrictions apply:**

- 1 d) **The inlet valves for the system are not to be connected to any hose or piping (dust covers are**
2 **permitted) when not in use.**
- 3 e) **When the flushing system is in operation, the discharge hose is only to be connected to the port**
4 **for the product type being flushed from the discharge line.**
- 5 f) **Following the flushing process, indications and recording elements must be reset to zero prior**
6 **to beginning a commercial delivery.**
7 **(Added 20XX)**

8 **UR.2.6.2. Records.** Whenever, prior to delivery, a different product is pumped through the discharge hose
9 to avoid contamination, a record including the date, time, original product, new product, and gallons pumped
10 shall be maintained. These records shall be kept for a period of 12 months and available for inspection by the
11 weights and measures authority.
12 (Added 2018)

13 The Committee heard from Mr. Jim Willis (NY, submitter) and provided an update that contained amended language
14 with modifications to UR.2.6.2 and creating UR.2.6.3. The amendments were agreed upon by the other joint
15 submitters, NIST OWM and Murray Equipment. He stated that the new proposed language would hold device owners
16 responsible for ensuring there is no cross-contamination of fuels and also allows jurisdictions to prohibit using
17 manifold flush systems or dispensing dissimilar products through a single meter. The Meter Manufacturers
18 Association, Mr. John Hathaway (Murray Equipment), Ms. Cheryl Ayer (NH), and Mr. John McGuire (NJ) also voiced
19 support for the amended language and urged the item be given a voting status. Mr. Hal Prince (FL) opposes the entire
20 item, indicating the use of a single meter to dispense different products is not legal in his state and has concerns of
21 cross-contamination of fuel. During the Committee work session, the committee assigned this item a voting status
22 with the amended language seen above as the item under consideration. The item as presented to the 2022 NCWM
23 interim meeting can be seen below the item under consideration.

24 **Regional Associations' Comments:**

25 WWMA 2021 Annual Meeting: Matt Douglas (California - DMS): California supports further development. Has
26 there been any further development since annual meeting?

27 The WWMA S&T Committee recommends the status remain Developmental. The Committee recommends that the
28 submitters (NIST, New York and Murray Equipment) continue their work together to further develop the item.

29 SWMA 2021 Annual Meeting: No comments were received on this item. NIST requests this item remain
30 Developmental.

31 This committee recommends the status remain Developing at the request of the submitter.

32 CWMA 2021 Interim Meeting: The committee heard comments from the floor. Diane Lee-NIST comments about
33 this item are in NCWM Annual report. Charles Stutesman-Kansas was the intent of this item for vehicle motor fuel or
34 for all items such as home heating oil.

35 CWMA S&T Committee recommends item as a developing item.

37 NEWMA 2021 Interim Meeting: Comments were heard from Jim Willis (New York) as submitter of this item. He
38 stated that communication was in process with Murray Controls in regards to changes to this proposal. The flushing
39 “systems” have been around for decades and not just as OEM systems. The driver would climb on top the truck to
40 flush a line. Now they can flush the hose without the danger of falling off the truck. Some suggestions have been made
41 to limit the products carried on the truck to similar products. NYS does not support such language as the flush system
42 actually allows for the safe clearing of the hose and minimizes contamination. A flush manifold enables a truck to
43 carry different products at the same time. Jim Willis (New York) recommends further development. Lou Sakin

- 1 (Hopkinton/Northbridge, MA) asked when development may be finished. Jim Willis responded that hopefully by the
 2 NCWM Interim meeting. John McGuire (New Jersey) supported developing status.
- 3 The NEWMA Specifications and Tolerances Committee recommends that this item remain in Developing Status and
 4 encourages New York, NIST and Murray Controls to continue working towards full development.

CWMA Report: VTM-18.1
<p>Regional recommendation to NCWM on item status:</p> <p><input checked="" type="checkbox"/> Recommend as a Voting Item on the NCWM agenda <input type="checkbox"/> Recommend as an Information Item on the NCWM agenda <input type="checkbox"/> Recommend as an Assigned Item on the NCWM agenda <i>(To be developed by an NCWM Task Group or Subcommittee)</i> <input type="checkbox"/> Recommend as a Developing Item on the NCWM agenda <i>(To be developed by source of the proposal)</i> <input type="checkbox"/> Recommend Withdrawal of the Item from the NCWM agenda <i>(In the case of new proposals, do not forward this item to NCWM)</i> <input type="checkbox"/> No recommendation from the region to NCWM <i>(If this is a new proposal, it will not be forwarded to the national committee by this region)</i></p>
<p>Comments and justification for the regional recommendation to NCWM: <i>(This will appear in NCWM reports)</i></p> <p>No comments from the floor. The CWMA S&T Committee recommends this item to remain a voting item.</p>

- 5
- 6 Additional letters, presentation and data may have been submitted for consideration with this item. Please refer to
 7 <https://www.ncwm.com/publication-16> to review these documents.

8 **VTM-20.2 A Table T.2. Tolerances for Vehicle Mounted Milk Meters.**

9 *NOTE: This item was revised based on changes that were made by the Committee at the 2021 Interim Meeting. The*
 10 *item under consideration was removed from the voting consent calendar at the 2021 Annual Meeting and the S&T*
 11 *Committee made this a developing item)*

12 **Source:**
 13 POUL TARP A/S

14 **Purpose:**
 15 Change tolerances to accommodate more efficient milk-metering systems.

16 **Item Under Consideration:**
 17 Amend Handbook 44, Vehicle-Tank Meters Code as follows:

18 **T.2. Tolerance Values.** – Tolerances shall be as shown in Table 1. Accuracy Classes and Tolerances for Vehicle-
 19 Tank Meters Other Than Vehicle-Mounted Milk Meters and Table 2. Tolerances for Vehicle-Mounted Milk Meters.
 20 (Amended 1995, **20XX**)

Table 2. Tolerances for Vehicle-Mounted Milk Meters		
Indication (gallons)	Maintenance Tolerance (gallons)	Acceptance Tolerance (gallons)
100	0.5	0.3
200	0.7	0.4
300	0.9	0.5
400	1.1	0.6
500	1.3	0.7
Over 500	Add 0.002 gallon per indicated gallon over 500	Add 0.001 gallon per indicated gallon over 500

1 (Added 1989)

Table 2. Tolerances for Vehicle-Mounted Milk Meters		
	Acceptance Tolerance	Maintenance Tolerance
Complete Measuring System	0.5%	0.5%
Meter Only	0.3%	0.3%

2 (Amended 20XX)

3 **Background/Discussion:**

4 A Milk Meter Tolerance Task Group was formed and assigned to this item. Please contact the task group chair for
5 more information:

6 Mr. Charlie Stutesman
7 Kansas Department of Agriculture
8 785-564-6681, charles.stutesman@ks.gov

9 Existing tolerances are based on the accuracy of the Flow meter itself. The proposed Tolerances are based on Milk
10 Metering Systems where the magnetic flow meter is a part of the Milk Metering system handling milk containing air.

11 The accuracy of the Flow meter will always be influenced by the way it is used. The only way you can obtain the
12 accuracy described by the manufacture is when the flow meter is operating as a “stand alone” unit and, equally
13 important, only if the product passing through the flow meter is complete air-free.

14 The submitter provided the following:

15 During the past 20 years, the need for improved efficiency in the collection of milk has resulted in the use of milk
16 pumping equipment being installed on milk tankers.

17 One of the most obvious places for a modern Dairy to optimize is the amount of time that the milk tanker uses to
18 make a collection. If you can reduce the collection time at each farmer, the Dairy will be able to get a significant
19 reduction in collection and transport cost for the benefit of the Farmer, Consumer and the Dairy itself. At the same
20 time, you will get an environmental benefit as a result of reduced CO2 in the milk collection process.

21 The consequence of introducing pump systems on milk tankers is that it causes air to be mixed with the milk
22 which again will influence the accuracy of the magnetic flow-meter mounted in the system. Milk entrains air
23 unlike petroleum liquids which do not. As you know, the flow meter will count anything that passes through the
24 meter – liquid as well as air – and it is therefore essential that as much air as possible is removed from the milk

1 before it reaches the flow-meter. However, it is widely recognized that it is not possible to remove all the air from
2 the milk, which will result in an inaccuracy.

3 It is therefore essential that the tolerances for vehicle mounted milk pump systems using magnetic flow-meters
4 for determining milk volume reflects today's way of collecting milk. This means that existing Tolerance for milk
5 meters cannot be used when the milk meter is a part of a system where different system parts will influence the
6 accuracy of the count. Such milk metering systems will need to be classified with their own tolerances.

7 Based on our 25 years of experience as a manufacturer of these systems and more than 3000 installations on milk
8 trucks operating in more than 15 countries, we would like to propose that the Tolerance for Vehicle Mounted
9 Milk Metering Systems is changed from 0.3% to 0.5% and that the tolerances will be listed and classified
10 separately and not be associated with products from the oil industry. Our proposal is consistent with Weights &
11 Measures tolerances accepted around the world.

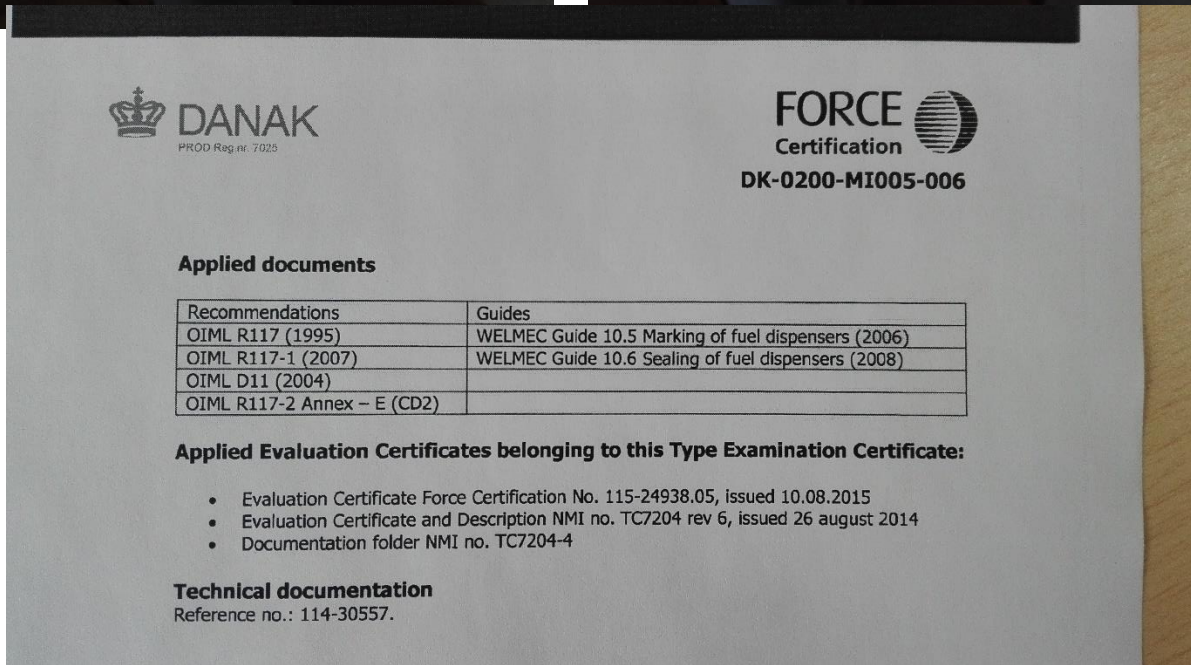
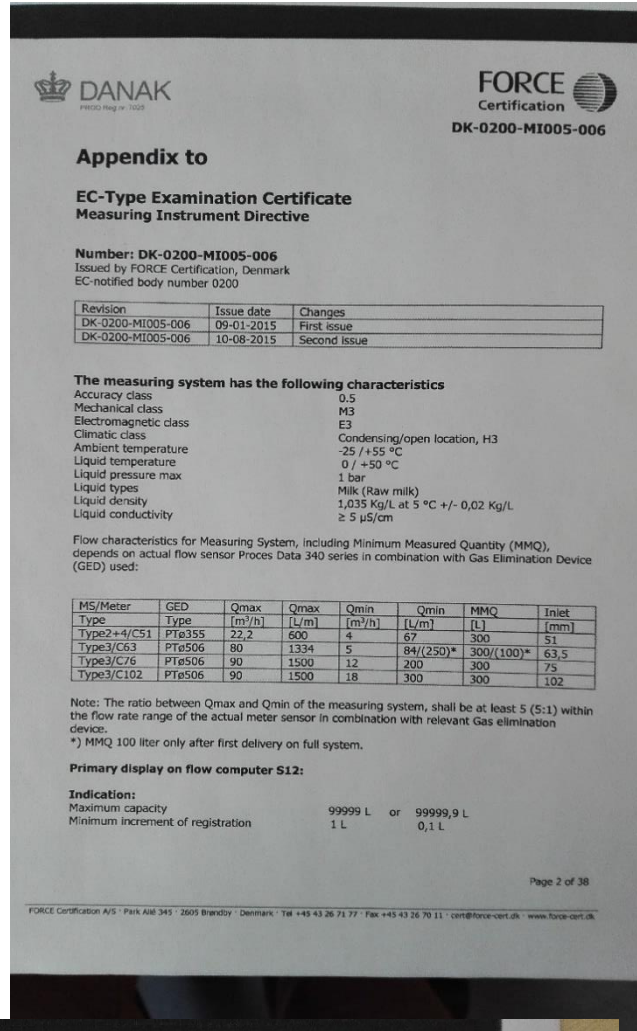
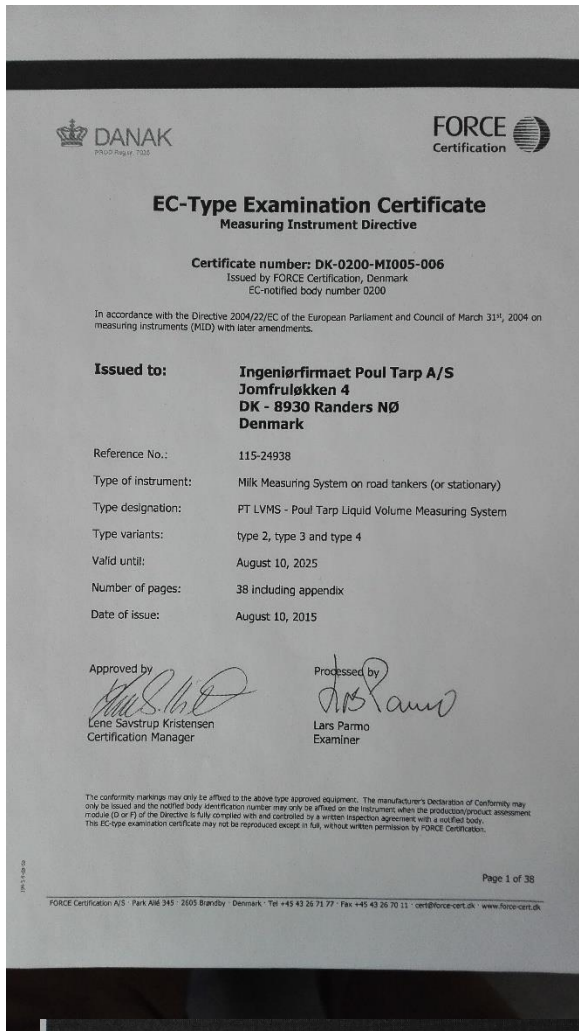
12 We hope that the NCWM will consider our proposal and we will be more than happy to meet with you and answer
13 any questions you may have. We believe that a change of Tolerance is necessary in order for the Handbook 44 to
14 reflect today's milk collection and the technical progress within milk collection.

15 Yours sincerely

16
17 Poul Tarp
18 President POUL TARP A/S

19 The POUL TARP milk pump system holds an MID approval which is recognized and in accordance with guidelines
20 and standards described in the **OIML - INTERNATIONAL ORGANIZATION OF LEGAL METROLOGY**

1 FLOW COMPUTERS REGULATION IN THE US:



1 A representative from the Dairy Farmers of America, stated that they oppose the increase in tolerance but supports the
2 use of VTM metering systems. Mr. Carey McMahon (Poul Tarp) pointed out that the Poul Tarp system can be accurate
3 for any size measurement, but the beginning and end of the measurement would not be accurate measures (within
4 tolerance) due to entrained air in the product when the flow is not uniform. Mr. Dmitri Karimov (MMA) stated that
5 the proposal should be further developed and pointed out that due to the tolerance structure becoming more stringent
6 as the volume of the measurement increases, the acceptance tolerance at 500 gallons is unreasonable. Mr. Hal Prince
7 (Florida) stated that he does not agree with expanding the tolerances. Mr. Prince believes that air elimination should
8 be the focus and that the proposal should be assigned to a task group. Mrs. Tina Butcher (NIST OWM) noted that
9 testing should be performed using multiple quantities and flowrates. Mr. Charles Stutesman (KS) pointed out that
10 confusion is generated by multiple HB 44 codes addressing the measurement of milk and that the proposal should be
11 assigned to a TG to sort this out. Mr. Stutesman also pointed out there is no requirements in HB 44 for air elimination
12 pertaining to milk metering in these codes. Mrs. Butcher noted that the current HB 44 requirements may not be
13 flexible enough for this new technology and that the existing codes may need to be reviewed and updated.

14 Ms. Leigh Hamilton (Piper) stated that this is not simply a consideration of only a change in tolerances. There are
15 other requirements (currently in the OIML standard) that should also be considered in making any changes to the
16 existing HB 44 requirements. Mr. Mike Keilty (Endress+Hauser) stated that air elimination is a difficult problem to
17 mitigate and noted that he is not sure if it is necessary to expand the existing tolerances or make other amendments.
18 Mr. Carey McMahon (Poul Tarp) stated that using the existing HB 44 tolerances in the VTM Code, at a draft of 5000
19 gallons, the tolerance value is highly unreasonable (KS) noted that the type evaluation performed on the Piper system
20 was limited to a draft of 300 gallons. If evaluation had included other draft sizes, the Piper system may have failed
21 the testing.

22 Mr. Ken Ramsburg (MD) stated that the proposal should be given a developing status. Mr. Ramsburg agreed that
23 there is no existing requirement for this type of system addressing air elimination and stated that the flow meter, air
24 eliminator, plumbing, and pumps all need to be considered during evaluation and the evaluation should be conducted
25 on the system.

26 Mr. Tim Chesser (AR) questioned whether the flow meter used in the system is appropriate and noted that there are
27 many unanswered questions surrounding this issue. Mr. Jim Willis (NY) recommended a developing status for this
28 item. Mr. Kevin Schnepf (CA) stated that although he is opposed to relaxing existing tolerances, he supports the
29 development of this proposal by an assigned task group.

30 During the Committee's work session, the committee agreed that this item has merit and should be given an Assigned
31 status. The charge to the assigned task group will be to address three HB 44 codes (VTM, Farm Milk Tanks and Milk
32 meters) to review the requirements and tolerances found in these codes and assess the need for changes.

33 NCWM 2020 Annual Meeting: Due to the 2020 Covid-19 pandemic, this meeting was adjourned to January 2021, at
34 which time it was held as a virtual meeting. Due to constraint of time, only those items designated as 2020 Voting
35 Items were addressed. All other items were addressed in the subsequent 2021 NCWM Interim Meeting.

36 NCWM 2021 Interim Meeting: The Committee heard from Mr. Charles Stutesman (KS, Char of the Milk Meter Task
37 Group) who gave an update on the task group activities. Mr. Stutesman reported that the Milk Meter Task group
38 worked via e-mail communication and reviewed and discussed the proposed Milk Meter Tolerances in Agenda item
39 VTM-20.2. The Milk Meter Task Group also discussed the tolerances that are included in NIST HB 44 for Milk
40 meters in various parts of HB 44 which include the VTM, Section 3.31, Farm Milk Tanks, Section 4.42., Mass Flow
41 Meters, Section 3.37, and Milk Meters, Section 3.35. Mr. Stutesman also reported that the task group reviewed OIML
42 tolerances for milk meters. Mr. Stutesman stated that after a review of the various tolerances, the task group agreed
43 that the OIML tolerances provide tolerances that encompassed the system of measuring milk and not just a tolerance
44 for the performance of the meter. The Milk Meter Task group agreed with proposing the use of the OIML milk meter
45 tolerance as the milk meter tolerances in the VTM code. Mr. Stutesman provided a copy of the proposed changes to
46 VTM-20.2. The proposed tolerances will align the tolerances in the VTM Code for Milk Meters with OIML Milk
47 Meter Tolerances. Mr. Stutesman requested that this item move forward as a Voting item. The Committee also heard
48 from Clark Cooney who noted that he supported the items as Developing because one company mentioned meeting
49 the existing tolerances. It was mentioned that the company's testing was only performed over a limited range of
50 volumes.

1 During the committees work session the committee agreed with the proposal from the milk meter task group to adopt
 2 OIML tolerances for milk meters in the VTM code, that this item be given a voting status, and that the item under
 3 consideration be replaced with the work groups proposal to adopt OIML tolerances. The committee also agreed with
 4 expanding the task group to address other milk meter codes in HB 44. The Item Under Consideration above are the
 5 tolerances agreed to by the milk meter task group and that align with OIML tolerances.

6 NCWM 2021 Annual Meeting: Mr. Charlie Stutesman provided an update on the milk meter task group activities.
 7 Mr. Stutesman noted that there was a field trip to observe milk metering systems. He noted that the proposed
 8 tolerances will align the milk tolerances with the OIML tolerances for milk meters and Mr. Stutesman noted that the
 9 OIML tolerances provides one tolerance for the meter and another tolerance for a milk metering system. He also
 10 noted that it may be impractical to perform an air eliminator test on these devices due to comingling of product.

11 During the committees work session, the Committee agreed to a Voting Status for this item and added it to its voting
 12 consent calendar.

13 During the voting session, Mr. Charlie Stutesman asked that consideration be given to adding a non-retroactive date
 14 to the proposed tolerances. It was questioned during the discussion that if a non-retroactive date was added to the
 15 tolerances, then, what tolerances would apply to existing meters that had been manufactured and tested prior to the
 16 non-retroactive date. One of the concerns expressed with having a new tolerance table without a nonretroactive date
 17 was whether or not existing devices would be required to be reevaluated in the NTEP. The conference voted against
 18 adding the nonretroactive requirement to the proposed tolerance table and the item under consideration to change the
 19 tolerances failed to receive the 27 votes from the House of State Representatives, so the item failed and went back to
 20 the S&T committee. The S&T Committee agreed to a Developing status for this item.

21 **Note: For reference, the Item under Consideration that was included in the 2021 NCWM Interim Meeting**
 22 **Agenda is provided below:**

Table 2.		
Tolerances for Vehicle-Mounted Milk Meters		
Indication (gallons)	Maintenance Tolerance (gallons)	Acceptance Tolerance (gallons)
100	0.5 <u>0.6</u>	0.3 <u>0.5</u>
200	0.7 <u>1.2</u>	0.4 <u>1.0</u>
300	0.9 <u>1.8</u>	0.5 <u>1.5</u>
400	1.1 <u>2.4</u>	0.6 <u>2.0</u>
500	1.3 <u>3.0</u>	0.7 <u>2.5</u>
Over 500	Add 0.002 <u>0.006</u> gallons per indicated gallon over 500	Add 0.001 <u>0.005</u> gallons per indicated gallon over 500

23 NCWM 2022 Interim Meeting: Mr. Charlie Stutesman (KS) spoke as chairperson of the Milk Meter Task Group. He
 24 requested that this item be assigned back to the task group for further development. Mr. Stutesman provided an update
 25 on the task group meeting in January 2022 in which they discussed tolerances in both 3.31 Vehicle Tank Meters and
 26 3.35 Milk Meters and the need to have the tolerance be applied to both vehicle mounted and station meters as the
 27 manufacturers are developing meters that will be capable of being installed in either application. The tolerance tables
 28 can be found in the supporting documents. Mr. Stutesman also renewed the task groups request to expand its scope
 29 to include possibly creating a new code that contains requirements of both vehicle mounted and stationary milk meters
 30 and metering systems due to the unique properties of milk as a liquid. Speaking on behalf of himself, Mr. Stutesman
 31 (KS) stated that he has provided a document in the supporting documents that outlines the four active and five inactive
 32 NTEP certified meters and metering systems in terms of test draft size and applicable tolerances. He noted that the
 33 active four have a range of 0.12%-0.6%. He also noted that milk meters are the only liquid measuring device where
 34 the volume tolerance decreases as the draft size increases and suggests percentages more in line with OIML tolerance
 35 would be more appropriate. Mr. Ken Ramsburg (MD) suggested combining the two tolerances to be used for field

1 evaluations. Ms. Diane Lee (NIST OWM) commented that the task group should work toward making all test methods
2 uniform. Mr. Doug Musick (KS) and Mr. Matt Douglas (CA) supported assigning this item to the task group for
3 further development. During committee work sessions, the committee agreed to assign this item back to the milk
4 meter task group so they may continue to ascertain data. In addition, the committee agreed to request that NCWM
5 Chairman Ivan Hankins expand the scope of the task group to include all reference to milk meters, meter systems and
6 related test methods, specifications and tolerance in an effort to harmonize the codes.

7 **Regional Associations' Comments:**

8 WWMA 2021 Annual Meeting: Diane Lee (NIST OWM): put forth by task group working on milk meters. They're
9 still in process of reviewing. It was put forth to vote but last-minute change to make it non retroactive. This put it back
10 to developing. What would happen to devices that are currently in the field? During annual meeting this was returned
11 back to developing and NIST supports developing.

12 The WWMA S&T Committee recommends the status remain Developmental. During the WWMA S&T Work Session
13 Diane Lee (NIST OWM) was asked for further clarification on her testimony. She provided the following clarification:
14 "During the Annual Meeting a proposal was made to add a non-retroactive date. Because questions were raised as to
15 how this would affect existing devices the item was moved from Voting to Developing." The Committee looks
16 forward to hearing from the working group.

17 SWMA 2021 Annual Meeting: No comments were received on this item. This committee would like to see more
18 evidence and reasoning on why these devices should not have to meet the existing tolerances, and why the tolerances
19 listed are appropriate.

20 This committee recommends the item remain Developing so that the submitters can gather more evidence about the
21 accuracy of these devices.

22 CWMA 2021 Interim Meeting: The committee heard comments from the floor. Charles Stutesman-Kansas would
23 like to see item be returned to task group.

24
25 CWMA S&T Committee recommends that the item be assigned to Milk Meter Tolerance Task Group and be an
26 assigned item.

27 NEWMA 2021 Interim Meeting: Jim Willis (New York) commented as a member of the task group about the field
28 trip that was taken in Rochester NY just prior to the NCWM meeting in July to witness the truck mounted Milk Meters
29 in action. The task group is asking for recommendations in-regards to a tolerance value that people would be
30 comfortable with. Jim Willis commented that the tolerance of 0.5% is considered too large by some, but we have
31 0.4% in the handbook now in-regards to checking a milk tank with a meter. Jimmy Cassidy (MA) asked if any systems
32 currently meet the requirements in the handbook and Jim Willis (New York) replied that currently there is one milk
33 meter system on tank trucks that meets the requirements currently in the handbook.
34

35 The NEWMA Specifications and Tolerances Committee recommends that this item remain in Developing Status.

CWMA Report: VTM-20.2	
Regional recommendation to NCWM on item status:	
<input type="checkbox"/>	Recommend as a Voting Item on the NCWM agenda
<input type="checkbox"/>	Recommend as an Information Item on the NCWM agenda
<input checked="" type="checkbox"/>	Recommend as an Assigned Item on the NCWM agenda <i>(To be developed by an NCWM Task Group or Subcommittee)</i>
<input type="checkbox"/>	Recommend as a Developing Item on the NCWM agenda <i>(To be developed by source of the proposal)</i>
<input type="checkbox"/>	Recommend Withdrawal of the Item from the NCWM agenda <i>(In the case of new proposals, do not forward this item to NCWM)</i>
<input type="checkbox"/>	No recommendation from the region to NCWM

<i>(If this is a new proposal, it will not be forwarded to the national committee by this region)</i>
Comments and justification for the regional recommendation to NCWM: <i>(This will appear in NCWM reports)</i> Charlie Stutesman – KS, Chair of Milk Meter Tolerance Task Group (MMTTG) – Following 2022 NCWM Interim meeting, this item was sent back to the MMTTG. Moving forward with staying with original tolerances that were proposed. Request to expand scope has been submitted. There will be a MMTTG meeting prior to the July annual meeting. Hoping to move forward and elevate to voting status for next cycle. The CWMA S&T Committee recommends this item to remain an assigned item.

1 Additional letters, presentation and data may have been submitted for consideration with this item. Please refer to
 2 <https://www.ncwm.com/publication-16> to review these documents.

3 **LPG – LIQUIFIED PETROLEUM GAS AND ANHYDROUS AMMONIA LIQUID-**
 4 **MEASURING DEVICES**

5 **LPG-22.1 V A.1. General., and Appendix D – Definitions. Liquefied Petroleum Gas**
 6 **Retail Motor Fuel Device.**

7 **Source:**
 8 North Carolina Department of Agriculture and Consumer Services

9 **Purpose:**
 10 Provide a clearer definition of retail motor fuel device, in relation to LP-Gas, is needed to allow for the continued use
 11 of much of the existing dispenser equipment in the field. Those that are for delivery into a vehicle should comply with
 12 the appropriate HB 44 requirements, while those that dispense into a portable container, even if later used as a “motor
 13 fuel”, can used a non-RMFD dispenser.

14 **Item Under Consideration:**
 15 Amend Handbook 44, Liquefied Petroleum Gas and Anhydrous Ammonia Liquid-Measuring Devices Cod as follows:

16 A.1.General. – This code applies to devices used for the measurement of liquefied petroleum gas and anhydrous
 17 ammonia in the liquid state, whether such devices are installed in a permanent location or mounted on a vehicle.
 18 **For retail motor fuel devices, see Appendix D, definition of liquefied petroleum gas retail motor fuel device.**

19 And amend Handbook 44, Appendix D – Definitions as follows:

20 **Liquefied Petroleum Gas Retail Motor Fuel Device. – A device designed for the measurement and delivery**
 21 **of liquefied petroleum gas used as a fuel for internal combustion engines in licensed vehicles bearing a state**
 22 **or federal license plate for use on public roads. The term means the same as “retail motor fuel dispenser”**
 23 **and “retail motor fuel device” as it appears in section 3.32 LPG and Anhydrous Ammonia Liquid-**
 24 **Measuring Devices [3.32]**

25
 26 motor-fuel device or motor-fuel dispenser or retail motor-fuel device. – A device designed for the measurement
 27 and delivery of liquids used as fuel for internal-combustion engines. The term “motor-fuel dispenser” means the
 28 same as “motor-fuel device”; the term “retail motor-fuel device” applies to a unique category of device. (Also
 29 see **definition definitions of “retail device.” and “liquefied petroleum gas retail motor fuel dispenser”**) [3.30,
 30 **3.32, 3.37]**

31 **Previous Action:**
 32 New

1 **Original Justification:**

2 By definition in HB 44, LP-Gas (propane) is a motor fuel, however the majority of propane that is sold is not for motor
3 fuel use. Most dispensers in the field are to fill bottles/cylinders/containers, and should be able to continue in that
4 purpose, even if that container may end up fueling a motor, such as a forklift, mower or generator. I think the intent
5 of a “retail motor fuel device” is that the majority of that product is going into vehicles. So, I have purposely chosen
6 to use “licensed vehicles” to help define the appropriate device as “highway” and “non-highway” is a separate road
7 tax issue. I think it is too much to ask locations, such as campground, with a dispenser to primarily fill grill cylinders,
8 to add a retail motor fuel device because they occasionally fill a container that may be used on propane lawn mower,
9 or similar equipment.

10 I suggest an addition to section A.1. to draw attention to this definition and the applicability of the code in that context.
11 The alternative would be to change all instances of “retail motor fuel dispenser” and “retail motor fuel device” in
12 section 3.32 to “liquefied petroleum gas retail motor fuel device”.

13 The problem encountered by our staff is that existing, container filling dispensers later had a “T” installed and another
14 hose was added, which had a K15 nozzle on it, currently required by the *LP-Gas Code* for filling vehicles. At that
15 time, it was determined the equipment was being used., in part, as a retail motor fuel device and the appropriate HB
16 44 sections applied, which they could not meet (they were installed after the 2017 requirements took effect). I will
17 note the existence of the nozzle alone does not make it and RFMD, as containers can be retrofitted to accept that
18 nozzle, but it is an indication that questions on equipment usage need to be asked.

19 There are currently several NTEP approved LPG retail motor fuel dispensers in the marketplace and are defined by
20 those manufacturers as such. This would maintain the level playing field for both the manufacturers and the businesses
21 that have already installed LP-Gas RMFDs for the purpose of fueling vehicles.

22 The submitter acknowledged that This will effectively define devices for use with “vehicles” and “equipment”. Some
23 would suggest that current HB 44 requirements should apply to all dispensers that may result in usage as a “motor
24 fuel”, but this is not practical in terms of cost of equipment given the fraction of that type sale many locations may
25 have. This is not how we typically consider items, but as LP-Gas, a long existing product, and corresponding devices,
26 is moving more into the alternative fuel market, there should be some consideration given to better determine where
27 a RMFD is required. The alternative is to not enforce the requirements at all or selectively enforce them at some
28 locations and not others, which is not equitable to the industry or the customers.

29 The submitter requested that this be a Voting Item in 2022.

30 **Comments in Favor:**

31 **Regulatory:**

- 32 • The submitter of this item explained the need to accurately define devices that meter liquid propane
33 gas (LPG) as a motor fuel. There have been instances where a device that is primarily used for filling
34 bottles or vessels has been retrofitted with a nozzle to also fill vehicles, essentially making it a retail
35 motor fuel device. A few regulators commented that the term “license” may be confusing as some
36 states require off-road vehicles to be licensed as well. Several regulators voiced support of this item.

37 **Industry:**

- 38 • A representative of an LPG trade organization voiced support for this proposal.

39 **Advisory:**

- 40 •

41 **Comments Against:**

42 **Regulatory:**

- 43 •

1 **Industry:**

- 2 •

3 **Advisory:**

- 4 •

5 **Neutral Comments:**

6 **Regulatory:**

- 7 •

8 **Industry:**

- 9 •

10 **Advisory:**

- 11 •

12 **Item Development:**

13 NCWM 2022 Interim Meeting: During the committee work session, the committee discussed the term “licensed
 14 vehicles” and the use of alternate language. After deliberation, the committee settled on language they feel would be
 15 acceptable to the body (“vehicles bearing a state or federal license plate for use on public roads”). The updated
 16 language appears in the Item Under Consideration as a voting item.

17 **Regional Associations’ Comments:**

18 WWMA 2021 Annual Meeting: Diane Lee (NIST OWM): This is a newer item. They will be meeting to discuss
 19 ramifications. Bruce Swiecicki (National Propane Gas Association): 3 items addressing the same problems. He is in
 20 favor of this item. They submitted 22.3. All of the LPG proposals would be favorable. (he's submitted info and
 21 comments (LPG-22.3). Dwight Farr (U-Haul Program Manager) : helps clarify definitions. He has no problems with
 22 this.

23 The WWMA S&T Committee recommends that this item be assigned a Developing status. The Committee agrees that
 24 the proposal has merit. The item’s language needs to be adjusted to provide clarity so that the proposed definition
 25 applies only to Retail Motor Fuel – Liquefied Petroleum Gas devices; The use of the term “designed” is vague. The
 26 Committee recommends that additional study is needed to assess how the revised definition will affect the application
 27 of specific sections of the code.

28 SWMA 2021 Annual Meeting: Steven Benjamin, North Carolina, stated that he is seeing businesses add hoses to
 29 existing devices, essentially creating a RMFD. He recommended moving this forward as a Voting Item. Mr. Keilty,
 30 Endress+Hauser, stated that we could explore adding a RMFD component to LPG to deal with this issue.

31 This committee feels this item is fully developed and recommends moving this item forward as a Voting Item.

32 CWMA 2021 Interim Meeting: The committee heard comments from the floor. Loren Minnich-Kansas had issues
 33 with the word “licensed”. What does it mean?

34
 35 CWMA S&T Committee recommends item as developing.

36 NEWMA 2021 Interim Meeting: During the NEWMA S&T open hearings, no Comments were heard on this item.

37
 38 The NEWMA Specifications and Tolerances Committee recommends that this item remain in Developing Status.

CWMA Report: LPG-22.1	
Regional recommendation to NCWM on item status:	
<input checked="" type="checkbox"/> Recommend as a Voting Item on the NCWM agenda <input type="checkbox"/> Recommend as an Information Item on the NCWM agenda <input type="checkbox"/> Recommend as an Assigned Item on the NCWM agenda <i>(To be developed by an NCWM Task Group or Subcommittee)</i> <input type="checkbox"/> Recommend as a Developing Item on the NCWM agenda <i>(To be developed by source of the proposal)</i> <input type="checkbox"/> Recommend Withdrawal of the Item from the NCWM agenda <i>(In the case of new proposals, do not forward this item to NCWM)</i> <input type="checkbox"/> No recommendation from the region to NCWM <i>(If this is a new proposal, it will not be forwarded to the national committee by this region)</i>	
Comments and justification for the regional recommendation to NCWM: (This will appear in NCWM reports)	
No comments from the floor.	
The CWMA S&T Committee recommends this item to remain a voting item.	

1 Additional letters, presentation and data may have been submitted for consideration with this item. Please refer to
 2 <https://www.ncwm.com/publication-16> to review these documents.

3 **LPG-15.1 D N.3. Test Drafts.**

4 **Previously LPG-4**

5 *Note: In 2019 this item was combined with Block 1 “Terminology For Testing Standards” and other items that*
 6 *addressed terminology for standards and the use of “master meters.” Based on comments heard during the 2021*
 7 *Annual Meeting, the S&T Committee recommended that all items that were combined with Block 1 “Terminology For*
 8 *Testing Standards” that originally appeared as a separate item or a separate block of items on the S&T agenda prior*
 9 *to 2019, be removed from Block 1 “Terminology For Testing Standards” and appear as originally presented.*
 10 *Item LPG-15.1 was removed from Block 1 “Terminology For Testing Standards” and now appears as a separate item*
 11 *on the 2022 Interim Meeting agenda.*

12
 13 **Source:**

14 Endress + Hauser Flowtec AG USA

15
 16 **Purpose:**

17 Amend Handbook 44 to allow field reference standards meters to be used to test and place into service dispensers and
 18 delivery system flow meters.

19 **Item Under Consideration:**

20 Amend Handbook 44, LPG and Anhydrous Ammonia Liquid-Measuring Devices as follows:

21
 22 **N.3. Test Drafts.**

23
 24 **N.3.1 Minimum Test** - Test drafts should be equal to at least the amount delivered by the device in 1 minute
 25 at its normal discharge rate.
 26 (Amended 1982)

27
 28 **N.3.2. Field Reference Standard Meter Test. – The minimum quantity for any test draft shall be equal**
 29 **to or greater than the amount delivered in one minute at the flow rate being tested.**
 30 **(Added 20XX)**

1 **Background and Discussion:**

2 This item has been assigned to the submitter for further development. For more information or to provide comment,
3 please contact:

4 Mr. Michael Keilty
5 Endress + Hauser Flowtec AG
6 970-586-2122, michael.keilty@us.endress.com

7 The use of transfer standards is recognized in Code sections 3.34 Cryogenic Liquid-Measuring Devices Code and 3.38
8 Carbon Dioxide Liquid-Measuring Devices Code and 3.39 Hydrogen Gas-Measuring Devices – Tentative Code.
9 Transfer standard is only defined for testing cryogenic liquid measuring devices. It has been pointed out that the term
10 transfer standard is not correct and that field reference standard meters may be more appropriate. See new the item
11 under consideration, updated on September 8, 2017.

12 Field evaluation of LPG meters and CNG dispensers and LNG dispensers is very difficult using volumetric and
13 gravimetric field standards and methods. The tolerances for these applications are such that using field reference
14 standard meters are more efficient and safer. With CNG and LNG and LPG applications, the field reference standard
15 meters are placed in-line with the delivery system as it is used to fill tanks and vehicles. The use of field reference
16 standard meters eliminates return to storage issues. The use of field reference standard meters is easier and faster
17 compared to the use of traditional field standards. The cost of using field reference standard meters and transporting
18 them is much less than the cost of traditional field provers and standards.

19 Recognition in Handbook 44 will enable States to allow field reference standard meters to place systems into service
20 and for field enforcement.

21 Volumetric field provers and gravimetric field proving are susceptible to environmental influences. The State of
22 Colorado uses a field reference standard meter to test propane delivery truck meters. The State of Nebraska has used
23 a field reference standard meter to test agricultural chemical meters. Other States have asked that there be recognition
24 in HB44 in order for their State to allow the use of field reference standard meters.

25 In some applications, field reference standard meters are not more accurate than the meters used in the application.
26 For that reason, longer test drafts and possibly more tests may need to be run.

27 The State of California is purported to have conducted a short study of field reference standard meters in the past. The
28 conclusion did not lead to wide adoption of the practice.

29 Section 3.37 Mass Flow Meters user requirement U.R.3.8. Return of Product to Storage, Retail Compressed Natural
30 Gas Dispensers requires that the natural gas which is delivered into the test container must be returned to storage. This
31 is difficult and most often not complied with when the test vessel contents are released to atmosphere. States often
32 have difficulties in remote locations finding suitable field reference equipment.

33 The Committee initially considered a proposal to modify paragraph N.3. Test Drafts and to add a new paragraph N.3.2.
34 Transfer Standard Test as shown below. Note that, in Fall 2016, Mr. Keilty provided an update to this proposal as
35 shown in the Item Under Consideration above.

36 **N.3. Test Drafts. –**

37
38 **N.3.1 Minimum Test** - Test drafts should be equal to at least the amount delivered by the device in one
39 minute at its normal discharge rate.
40 (Amended 1982)

41
42 **N.3.2. Transfer Standard Test. – When comparing a meter with a calibrated transfer standard, the**
43 **test draft shall be equal to at least the amount delivered by the device in 2 minutes at its maximum**
44 **discharge rate.**

1 The submitter recommended that NIST update EPO 28 for CNG dispensers and EPO 26 for LPG Liquid Measuring
2 Systems to include transfer standard meter tests. NIST Handbook 105-4 should also be revised to specifically address
3 the transfer standard meter and the requirements for use.

4 The S&T Committee might also consider amending Sections 3.30 Liquid-Measuring Devices Code and 3.31 Vehicle-
5 Tank Meters Code to allow transfer standard meters.

6 The Committee received written comments on all items in Block 4 and Block 5, as well as LPG-4 and MFM-2
7 emphasizing the need for there to be more study and discussion of the issues to assess the ramifications of all the
8 proposed changes. The Committee also received written comments from the SMA that it looks forward to further
9 information on these items and stating that it is important to be consistent in our use of terms across multiple sections
10 of NIST Handbook 44. The Committee agreed to carryover this group of items on its 2019 agenda to allow for further
11 discussion and development of these proposals.

12 NCWM 2019 Interim Meeting: The S&T Committee decided to combine the items on the agenda dealing with the
13 issue of transfer standard (including items already combined into blocks) into one block. Block 1 (New) of the Interim
14 Meeting report now includes Gen-3, Block 1 (original items from the 2019 interim agenda that appeared under Block
15 1), Block 2, LPG-3 and MFM-5, which were all separate items and blocks of items on the S&T Committee's 2019
16 Interim Meeting agenda (NCWM Publication 15). Agenda items Gen-3, Block 1, Block 2, LPG-3, and MFM-5 are
17 listed separately on the Interim agenda with a note added beneath each individual item referring the reader to the New
18 B1 items. All items under this New B1 have retained the same numbering system for ease in referring to the appendix
19 for discussion on each item.

20 2019 NCWM Annual Meeting: Mr. Brett Gurney (NCWM Chairman) commented regarding the formation of a Task
21 Group assigned to further develop this block proposal. The TG is charged with providing definitions for various types
22 of standards (transfer, field, reference, etc.) as well as the criteria to be met by these types of standards. The completion
23 date given to the TG is July 2021. The Committee agreed to the Assigned status for this block of items and looks
24 forward to hearing updates from the TG. the Chair of the task group was:

25 Mr. Jason Glass
26 Kentucky Department of Agriculture
27 502-573-0282, jason.glass@ky.gov

28 NCWM 2020 Interim Meeting: Field Standard TG Chair Jason reported that the Task Group met prior to the Interim
29 meeting and has begun discussion of the items under Block 1. Mr. Glass stated that bi-weekly teleconference meetings
30 were scheduled and that the group was optimistic but had significant work to accomplish.

31 Mr. Russ Vires (SMA) supports the Scale item, SCL 18.1; in this block, Mr. Dimitri Karimov (Meter Manufacturers
32 Association) supports the Task Group activities, Ms. Tina Butcher (NIST OWM) was encouraged with the progress
33 on terminology and provided an update on the Mass Flow Meter testing reporting that field testing was conducted
34 October 28 to November 1, 2019 and that State and Industry participation included Colorado, Florida, Oregon,
35 Emerson, and Tulsa Gas Technology.

36 Mr. Kurt Floren (Los Angeles Co., CA) raised concerns with GEN-19.1. regarding the definition of "Standard, Field"
37 and its reference to "stable" standards and how long a standard is expected to be stable, which is typically 1-year, for
38 which he believes should be longer. Mr. Floren also questioned the statement in the definition "tested over a range of
39 environmental and operational conditions that the measuring devices is used..." Mr. Floren noted that he was unsure
40 if all laboratories will have the capabilities to test over this wide range of conditions. Mr. Floren also expressed
41 concerns with the definition "Standard, Transfer" citing that this standard may not meet the fundamental
42 considerations requirement for standards over a long period of time or wide range of environmental conditions.

43 Mr. Steve Harrington (OR) echoed Mr. Floren's comments. Field Standard TG Chair Glass responded that these are
44 concerns of the TG and these issues will be discussed and considered as the TG develops these items.

45 During the Committee's work session, the Committee agreed that this item should remain an Assigned item.

1 NCWM 2021 Interim Meeting: NCWM Field Standard TG Chair, Mr. Jason Glass (KY) provided an update on the
 2 Task Group activities. Mr. Glass reported that the field standard Task Group is following the activities of the NIST
 3 Master Meter Project and that the Task Group reviewed API specifications for use of master meters as a standard and
 4 a test protocol that will be used to ensure uniformity in collecting data on master meters used as field standards. He
 5 also reported that the TG does not have a recommendation for this item. Mr. Glass also reported that he would be
 6 stepping down as the TG Chair. Mr. Mike Keilty (Endress+Hauser AG) thanked Chair Glass and the TG for their
 7 work and requested that Block 1, LPG-15.1, N.3. and Block 1 MFM-15.1, N.3 be removed from Block 1 items and to
 8 allow those items to move forward separate from the other Block 1 Items. Mr. Keilty stated that similar language was
 9 added to the Hydrogen code and that the proposed language in LPG-15.1 N.3. and MFM-15.1, N.3 will allow for the
 10 recognition of master meters as field standards. Mr. Henry Oppermann (WM-Consulting), stated that data is needed
 11 to ensure that master meters can be used over a range of conditions. Mr. Bob Murnane (Seraphin) stated that
 12 jurisdictions have the ability to use meters and that Block 1 LPG-15.1, N.3 and Block 1 MM-15.1, N.3 should remain
 13 in Block 1 until data is available to support the use of master meters as a standard. Mr. Keilty mentioned that there
 14 has been useful dialog regarding master meters in the TG, but that he is concerned that the TG is not close to deciding
 15 and he expressed concerns with the TG's focus on the NIST Master Meter Project. Ms. Tina Butcher (NIST OWM)
 16 provided an update on the NIST Master Meter Project and noted that States have the regulatory powers to accept or
 17 reject a standard. She also mentioned that NIST is working with States to collect data needed to assess master meters
 18 and preliminary testing was conducted and data was collected on CNG at Tulsa Gas Technology's facility in fall 2019.
 19 Ms. Diane Lee (NIST OWM) noted that NIST OWM feels that it is premature to add more language to the NIST
 20 Handbook 44 on master meters without data to support its use.

21 During the Committee's work session, the Committee agreed to keeps all items in Block 1 and that this item should
 22 remain with an Assigned status.

23 NCWM 2021 Annual Meeting: Mr. Glass reported that he would be stepping down as the Field Standard TG Chair.
 24 The Committee heard updates from members of the Task Group during open hearings. Mr. Mike Keilty
 25 (Endress+Hauser AG) noted that two of the items had been on the agenda since 2015 and requested that they be
 26 removed from the block and recommended recognizing the use of master meters. Other comments were to keep the
 27 items together until data is analyzed from the NIST Field Reference Standard Work Group to support the use of master
 28 meters but that if some items were removed from the block, all items should be removed from the block. Based on
 29 comments heard during the 2021 Annual Meeting, the S&T Committee recommended that all items that were included
 30 in Block 1 "Terminology For Testing Standards" that originally appeared as a separate item or a separate block of
 31 items on the S&T agenda in and prior to 2019, be removed from Block 1 "Terminology For Testing Standards" and
 32 appear as originally presented.

33 During the 2021 Committee work session the Committee recognized that the Task Group has accomplished all it is
 34 able to at this point and is recommending the Task Group be disbanded and will make said recommendation to the
 35 NCWM Chairman. The Committee agreed to break all items in Block 1 into individual items and designate them all
 36 as Developing. The Committee thanks the Task Group and its members for their work.

37 NCWM 2022 Interim Meeting:
 38 Item under consideration presented to 2022 NCWM Interim meeting as:

39 **N.3. Test Drafts.**

40 **N.3.1 Minimum Test** - Test drafts should be equal to at least the amount delivered by the device in 1 minute
 41 at its normal discharge rate.
 42 (Amended 1982)

43 **N.3.2. Field Reference Standard Meter Test. – The minimum quantity for any test draft shall be equal**
 44 **to or greater than the amount delivered in one minute at the flow rate being tested.**
 45 **(Added 20XX)**

46 Mr. Keilty shared a presentation on field standard meters during open hearings relevant to both LPG 15.1 and MFM
 47 15.1. The intent of the presentation was to describe initial and ongoing calibration traceability, compare OIML

1 tolerances vs NIST Handbook 44, describe the benefits and show example. An abbreviated copy of the presentation
2 is available on the NCWM website in the interim meeting documents archive. Mr. Keilty commented that he believes
3 LPG 15.1 and MFM 15.1 are fully developed and should receive voting status for the annual meeting. He has updated
4 the proposal to exclude the term “reference” from “field reference standard meter test”, as shown above. He requests
5 that the committee provide specific guidance if a developing status is assigned. A comment from industry (Bob
6 Murnane – Seraphin) stated that N.3.2 in the proposal conflicts with the current code which states normal test drafts
7 must be at least one minute at the maximum discharge flow rate of installation conditions. The current wording allows
8 for a test to be conducted at any flow rate for one minute. There was concern from a regulator (Charles Stutesman,
9 Kansas) echoing these concerns. Diane Lee (NIST) requested that more data be made available so that NIST is able
10 to compare worldwide data against test data compiled within the US by NIST. Mahesh Albuquerque (Colorado)
11 expressed support for this item to receive voting status. Marc Butler (Emerson Micro Motion) expressed confusion at
12 the two notes, thinking that perhaps they conflicted with each other; are they both needed or are they independent?
13 Tina Butcher (NIST) expressed that she recognizes the use and importance of master meters, but is concerned with
14 the purpose of this item. Tina suggests that the statement for use be reworked as test draft criteria is so critical. Tina
15 recommended and offered NIST OWM assistance on this item.

16 During the S&T Committee work session, the committee recognized the submitters desire that a voting status be
17 recommended but determined that there were too many concerns and confusion expressed. The committee
18 recommends that the submitter develop the item further by aligning language to existing language in Handbook 44,
19 clarifying the purpose to help avoid confusion of the new code on new equipment, and reaching out to NIST OWM
20 or other industry or regulatory officials for feedback.

21 **Regional Associations’ Comments:**

22 WWMA 2021 Annual Meeting: Michael Keilty (Endress + Hauser) : in 2014 - he submitted a form 15 to edit content
23 and add N.3.2. It was set to developing. Several W/M officials have supported this. Asks that this be a voting item in
24 2022. Bob Murnane (Seraphin) : this is to allow a field reference standard meter, this definition does not currently
25 exist. Recommends that this be withdrawn so that the definitions can be worked out. Diane Lee (NIST OWM) : this
26 item was put forth in 2015 - purpose was: to accept a specific master meter in the field. It's not necessary to ref. field
27 ref. standards in specific code. NIST and states are working to collect data to see if master meters can be used. States
28 are to determine which standards are to be used in the states. N.3.2 was an issue. there was no information as to justify
29 a different test draft size than was specified in N.3 or if it is necessary to use a field reference meter. Bruce Swiecicki
30 (National Propane Gas Association): he lent support to this discussion (master meters). It would be nice to have
31 something in HB44 to assist in uniformity. Michael Keilty (Endress + Hauser) : to address Diane Lee: he agrees and
32 disagrees. Agree: it was stated that jurisdictions are responsible for their own equipment, however, he was told by
33 states that they need something in HB44 to tell them what should be used. Again - wants voting on this item in 2022.

34 The WWMA S&T Committee recommends the status remain developmental. The Committee recommends that
35 consideration be made that this item be included in Block 5, as they refer to the same terminology in HB:44. A letter
36 was submitted to the Committee by Michael Keilty (Endress + Hauser) and will be posted to the NCWM website.
37 NIST OWM also submitted analysis on this item which can be found at the following link on the NCWM website :
38 <https://www.ncwm.com/annual-archive>

39 SWMA 2021 Annual Meeting: Mr. Oppermann, Seraphin, supports the Withdrawal of this item because it is
40 unnecessary, as master meters can already be recognized as field standards. Mr. Keilty, Endress+Hauser, the submitter
41 of this item, supports striking “Reference” and “Meter” from this proposal, and moving it forward as a Voting Item.
42 This committee feels that the item is fully developed and is looking forward to seeing more data on the performance
43 accuracy of master meters by the states that are currently using these devices.

44 This committee recommends this item move forward as a Voting item with the editorial changes requested by Mr.
45 Keilty.

46 CWMA 2021 Interim Meeting: The committee heard comments from the floor. Michael Keilty-Endress+Hauser
47 Flow asked that the item be moved to voting and if not, asks for suggestions from the committee on how to improve
48 item. Dr. Henry Opperman-Weights and Measures Consultants does not support the item. Says it does not explain
49 mass flow meter as a standard and where is the data that supports this item. Tina Butcher-NIST agreed with comments

1 from Dr. Henry Opperman. Charles Stutesman-Kansas agreed with Tina Butcher but understands the submitting of
 2 this proposal and should be moved as a voting item.

3 CWMA S&T Committee recommend this item moving forward as a voting item.

4 NEWMA 2021 Interim Meeting: Michael Keilty (Endress + Hauser Flowtec) as the submitter of this item, gave a
 5 history of the item from 2015 and is recommending voting status with changes striking text seen below. Michael also
 6 has submitted comments which are available on the NCWM website.

7 **N.3.2. Field Reference Standard Meter-Test. – The minimum quantity for any test draft shall be**
 8 **equal to or greater than the amount delivered in one minute at the flow rate being tested.**
 9 **(Added 20XX)**

10 Henry Opperman (Seraphin) commented that the latest information was not reviewed and changes are immature as
 11 data has not been produced to justify this. And he added that NIST OWM is currently undertaking a study to gather
 12 data and this data could help provide justification for this item and recommends further development. Rick Harshman
 13 (NIST OWM and Bob Murnane (Seraphin) also recommended further development.

14 The NEWMA Specifications and Tolerances Committee recommends that this item remain in Developing Status and
 15 asks that the submitter collaborate with NIST and or provide data to support this item.

CWMA Report: LPG-15.1	
Regional recommendation to NCWM on item status:	
<input checked="" type="checkbox"/> Recommend as a Voting Item on the NCWM agenda <input type="checkbox"/> Recommend as an Information Item on the NCWM agenda <input type="checkbox"/> Recommend as an Assigned Item on the NCWM agenda <i>(To be developed by an NCWM Task Group or Subcommittee)</i> <input type="checkbox"/> Recommend as a Developing Item on the NCWM agenda <i>(To be developed by source of the proposal)</i> <input type="checkbox"/> Recommend Withdrawal of the Item from the NCWM agenda <i>(In the case of new proposals, do not forward this item to NCWM)</i> <input type="checkbox"/> No recommendation from the region to NCWM <i>(If this is a new proposal, it will not be forwarded to the national committee by this region)</i>	
Comments and justification for the regional recommendation to NCWM: (This will appear in NCWM reports)	
<p>Micheal Keilty – Endress+Hauser – Mr. Keilty presented calibration data at the 2022 NCWM Interim meeting. No recommendations from NCWM have been released. Recommended a minor change that re-includes the word “meters” because it was confusing how to apply testing requirements. Both items explain the amount of test drafts that differ from other volume standards. Field standard meter provides flexibility for use across many different products and densities. Field Standards are tested against OIML and API standards using gravimetric methods that are NIST traceable. Accuracy and repeatability are long term, it is a maintenance free system with no moving parts. These systems save time and space, contain embedded diagnostics, are easy to use, and easy to maintain. It is easy to train the operator of these systems. NMI has issued a test report on this system. Various setups can be mounted to a rack and easily transported. SWMA and CWMA recommended this item move forward as voting item in the 2021 Interim meeting. Recommending placing as voting today and move forward for a vote this week.</p> <p>Jan Konijnenburg – NIST OWM - State and industry have a need to use various types of field test standards to evaluate commercial devices installed in the marketplace. NIST OWM recognizes the need to use various standards to test commercial devices and support the use of these standards when test data supports its use. The NIST OWM is also supporting the use of various types of field test standards through the purchase of several meters and the collection of data throughout the U.S. The purpose statement for Items LPG-15.1 (LPG & Anhydrous Ammonia Liquid-Measuring Devices Code) indicates the goal of this items is:</p>	

“to amend Handbook 44 to allow field reference standard meters to be used to test and place into service dispensers and delivery system flow meters.”

The proposed changes in Items LPG-15.1 suggest changes to the test draft criteria for devices covered under this code, which is not necessary to allow field reference standard meters to be used to test and place into service dispensers and delivery system flow meters.

Amongst the concerns raised to the S&T Committee over the proposed changes for LPG-15.1 is that it conflicts with existing test draft criteria and confusion over the application of the proposed requirement.

As such, given the long debate over multiple iterations of the proposals, OWM proposes that since the purpose of the proposal is to allow field reference standard meters to be used to test and place into service dispensers and delivery system, and the responsibility for allowance of these field test standards are already addressed in the NIST Handbook 44 Fundamental Considerations and Item Block 8 clarifies these responsibilities, that Consideration be given to the proposal in Item Block 8 which clearly states the responsibility for allowance of field standards along with a new proposal to add a general code requirement. (See Item Block 8 of the NIST OWM Analysis for the S&T Annual Meeting)

OWM Recommendation OWM recommends that this item be withdrawn and that consideration be given to Item Block 8.

Mike Johnson – NE – Supports this item and agrees with Mr. Keilty. Nebraska has had great success over the last 18 years using this method. Nebraska has over 300 mass flow meters and gravimetric testing isn't practical.

Bob Murnane – Seraphin –

The stated purpose on these proposals to amend Handbook 44 and to allow field standards meters to be used to test and place into service dispensers and delivery system flow meters. The current language adding N.3.2., has nothing to do with the purpose statement nor does have any effect at all on whether meters can be accepted or used as field standards.

Handbook 44 under fundamental considerations already allows for the use of field standards and /or equipment, as approved by the Director. There are already numerous meters in the field being used as standards that have been approved by State Directors under these fundamental considerations.

Note: Seraphin has a proposal, item OTH-22-1 that supports the Directors authority.

What is the reason and justification for N.3.2 when we already have a test draft size in N.3.1?

What data and analysis has been provided regarding the uncertainties associated with the field standard meters and the sizes of the drafts proposed in N.3.2.?

The proposal MFM-15.1., N.3.2 would impose constraints on the capability of the W&M officials to test mass flow meters.

Under the current paragraph N.3., W&M officials can conduct tests at any flow rate for any quantity that is equal to or greater than minimum measured quantity (MMQ) specified by the manufacture of the meter.

Under the proposed N.3.2., the minimum size of the test drafts must be greater than or equal to the quantity delivered in one minute at the flow rate at which the test is being conducted. Depending upon the measurement application and the test equipment available, this could substantially increase the size of the required test drafts for almost all flow rates for mass flow meters.

Example: Recently there was CNG testing performed in Colorado. The test drafts were for 1/3 of the capacity of the test cylinder (as specified in the EPO) and it took less than one minute to complete. In this case the proposed change to the size of the test draft on MFM15.1. would have prevented Weights & Measures officials from conducting the tests.

Weights and Measures officials should be able to test mass flow meters using any test draft size, equal to or greater than the MMQ over the range of flow rates. I did not do an extensive review but I did find six NTEP Certificates of Conformance that would not be able to be tested using the proposed MFM-15.1., N.3.2. What happens to them? If the proposal were adopted with its current purpose statement it could be interrupted that every meter is acceptable for use as a field standard. How do you know which meters are acceptable for use as a field standard and which ones are not? For example, if a meter is brought into the United States from another country, can it be used as a field standard. This proposal will cause confusion for both Weights and Measure officials and testing companies.

Additional Notes:

NIST and Seraphin requested Mike Keilty's participation in a meeting on these items and he declined.

There has been a total of six changes to the wording on these items since they were introduced.

Again, I would like to remind the committee that states are already using meters as field standards and this is permitted by the existing fundamental considerations. There is no need for these proposals. Seraphin Test Measures opposes items LPG-15.1. and MFM-15.1 and ask the committee to withdraw this item from consideration.
 Comment: Years on an agenda are not part of criteria for deciding if an item should be made a voting item.

Charlie Stutesman – KS - Regarding Fundamental Considerations: states already have the ability to decide what’s allowed. It already falls within The Director’s authority, but we have other existing codes in HB44 which reference transfer standards and specifically allowing their use for testing particular devices. The NIST EPOs are still in draft status and are a resource tool only. Flow rate will be more important going forward as gravimetric testing becomes more prevalent. Recommends sending to voting status. Does this only apply to mass flow meters as the standard? NIST stated they are using Coriolis meters. But the decision to use non-mass flow meters as the field standard rests with The Director. This will apply to any meter technology, not just mass flow meters.

Michael Keilty – Endress+Hauser - Other codes in HB44 contain advice on specific test drafts when using transfer standards. These proposals give test draft advice to handle slow flow devices. The EPO for CNG testing uses small containers but the EPO can be changed.

Ivan Hankins – IA – Mr. Hankins has witnessed these tests using these transfer standards at multiple flow rates and drafts. It took much less time. This technology will allow jurisdictions to test at a quicker pace, using less staff. Supports this proposal.

Bob Murnane – Seraphin – Mr. Murnane questioned if the draft size is merely a suggestion.

The CWMA S&T Committee recommends this moves forward as a voting item.

1 Additional letters, presentation and data may have been submitted for consideration with this item. Please refer to
 2 <https://www.ncwm.com/publication-16> to review these documents.

3 **LPG-22.2 W S.2.6. Zero-Set-Back Interlock, for Stationary Customer-Operated Retail**
 4 **Motor-Fuel Devices, Electronic.**

5 **Source:**
 6 U-Haul International, Inc.

7 **Purpose:**
 8 The proposal will address practical issues that propane marketers encounter when trying to comply with the zero
 9 setback requirements for propane stationary and truck-mounted meters in Handbook 44.

10 Amend Handbook 44, Liquefied Petroleum Gas and Anhydrous Ammonia Liquid-Measuring Devices Cod as follows:

11 *S.2.65.2. Zero-Set-Back Interlock for Stationary Customer-Operated Retail Motor-Fuel Devices - A device*
 12 *shall be constructed so that:*

13 (a) *after a delivery cycle has been completed by moving the starting lever to any position that shuts off the*
 14 *device, an automatic interlock prevents a subsequent delivery until the indicating elements and recording*
 15 *elements, if the device is equipped and activated to record, have been returned to their zero positions;*

16 (b) *the discharge nozzle cannot be returned to its designed hanging position (that is, any position where the*
 17 *tip of the nozzle is placed in its designed receptacle and the lock can be inserted) until the starting lever*
 18 *is in its designed shut-off position and the zero-set-back interlock has been engaged; and*

1 (c) *in a system with more than one dispenser supplied by a single pump, an effective automatic control valve*
2 *in each dispenser prevents product from being delivered until the indicating elements on that dispenser*
3 *are in a correct zero position.*

4 **[Retroactive Nonretroactive as of January 1, 2017 2023]**

5 (Added 2016, ~~Amended 2022~~ 20XX)

6 **Previous Action:**

7 New

8 **Original Justification:**

9 Motor fuel, within the context of NFPA 58, refers to any container that has the potential to provide propane to fuel an
10 engine. This can include a multitude of DOT cylinders and ASME containers that are not for the propulsion of an
11 automobile. Current mechanical meter technology utilized in a standard propane dispenser for the filling of portable
12 containers, such as those utilized in NFPA 58 for motor fuel applications or those that do power automobiles, are not
13 capable of being equipped with a zero-set-back interlock and the technology will not be potentially available until
14 2022, per meter manufacturers.

15 NFPA 58 currently does not allow the public to refuel its automobiles. All automobiles or other containers must be
16 filled by a specially trained employee. A proposed change has been introduced for consideration in the 2023 edition
17 of NFPA 58 that would permit public refueling of automobiles as long as the dispensing system meets very specific
18 safety requirements, including a specialized nozzle, and is furnished with visible instructions. Upon the acceptance of
19 this new public refueling allowance the propane industry agrees that Zero-Setback-interlocks are needed. These public
20 self-service automotive dispensing systems will be listed to Underwriters Laboratories Standard 495 and will be
21 dedicated to the filling of motor vehicles.

22 Most propane dispensed is for purposes other than motor-fuel. Pursuant to NFPA 58, this is accomplished by a trained
23 and certified employee dispensing propane, typically using mechanical meters, into cylinders and tanks. The
24 employee is trained and required to manually reset the meter to zero after each transaction and verify the meter is reset
25 prior to initiating a subsequent transaction. This has been and remains an accepted practice for dispensing propane.
26 This process is the industry standard for approximately 97% of all propane used in the United States. *See* U.S.
27 Department of Energy, Alternative Fuels Data Center afdc.energy.gov/fuels/propane_basics.html.

28 Unlike traditional motor-fuel, such as gasoline or diesel, customers cannot currently dispense propane into their
29 vehicles. If NFPA 58 is amended to allow customers to dispense their own propane into their vehicles and the demand
30 for propane as motor-fuel increases, the market will drive retailers to provide electronic customer-operated retail
31 motor-fuel devices to meet the demand and customer expectations for efficient and expedient fueling transactions. At
32 that time, the electronic customer-operated motor-fuel devices will certainly need to incorporate an automatic zero-
33 set-back interlock. It is simply too early in the process to effectively force mechanical retail motor-fuel devices out
34 of the market for such a small percentage of the retail propane market (approximately 3%).

35 It is difficult to counter the argument above. Opponents of this proposed change may argue that automatic zero-set-
36 back interlocks are necessary to prevent customers being overcharged for propane.

37 The submitter requested that this be a Voting Item in 2022.

38 **Comments in Favor:**

39 **Regulatory:**

- 40 • NCWM Interim 2022: Several regulators spoke in favor of this item but suggested that it be assigned a
41 developing status. Comments were heard to keep “customer operated” in the proposal and to work
42 with submitters of LPG-22.3.

1 **Industry:**

- 2 • NCWM Interim 2022: A propane industry representative speaking on behalf of the submitter
 3 commented that this proposal would work well for electronic meters but not analog as they would be
 4 costly to retrofit. He also suggested removing “customer operated” but keeping “electronic”. After
 5 hearing other comments from the floor, he offered to submit updated language to the committee to
 6 correct concerns and asked for a voting status.

7 **Advisory:**

- 8 •

9 **Comments Against:**

10 **Regulatory:**

- 11 •

12 **Industry:**

- 13 •

14 **Advisory:**

- 15 •

16 **Neutral Comments:**

17 **Regulatory:**

- 18 • NCWM Interim 2022: A regulator cautioned that this requirement may not allow electronic meters to
 19 meet marking requirements of retail motor fuel devices.

20 **Industry:**

- 21 •

22 **Advisory:**

- 23
 24 • NCWM Interim 2022: NIST OWM also indicated that the use of retroactive in the original proposal
 25 may not be the intended term and suggested using nonretroactive instead

26 **Item Development:**

27 NCWM 2022 Interim Meeting: During the committee work session, the committee received updated language that
 28 renumbered the item to reflect the current handbook and included “nonretroactive” with a new date. The committee
 29 agreed to update the item under consideration to reflect these changes. The committee also agreed to assign this item
 30 a developing status. The committee asked the submitter to work with the submitter of LPG-22.3 in order to consider
 31 combining the items and to make sure the language is consistent with other areas of the handbook.

32 Following the 2022 Interim Meeting the submitters of this item and Item LPG-22.3 collaborated on a joint proposal
 33 as requested. For this reason, the Committee has withdrawn this item. See Item LPG-22.3 for the new proposal.

34 **Regional Associations’ Comments:**

35 WWMA 2021 Annual Meeting: Dwight Farr (U-Haul Program Manager): they proposed this amendment. The
 36 majority of propane meters are mechanical - this forces them to switch to electronic. He wants this to only pertain to
 37 electronic meters. This will effect the infrastructure growth. This will deter alt. fuel options (sites just will not sell
 38 LPG as retail fuel instead of switching to electronic). customer cannot dispense their own LPG - has to be a specially
 39 trained associate. setting back every time a single customer brings in multiple tanks will be detrimental to the customer.
 40 this only applies to 3% of his customers. Wants this to be a voting item next year. Bruce Swiecicki (National Propane

1 Gas Association): supports this proposal as stated. This will go a long way towards fixing the problem. Cadence
2 Matijevich (Nevada) : Question for submitter: retroactive status? Dwight Farr (U-Haul Program Manager): retroactive
3 to 2017 - law was established at that year. Cadence Matijevich (Nevada): the way it is written, it will not suffice.
4 Dwight Farr (U-Haul Program Manager): if it needs to be changed, so be it.

5 The WWMA S&T Committee recommends based on testimony heard in open hearings and input from the NIST
6 advisors during the work session that this item be assigned a Developing status. The Committee also recommends
7 that the submitters of LPG-22.2 and LPG-22.3 combine their efforts to develop one of the items with consideration to
8 the 2022 version of NIST HB44.

9 SWMA 2021 Annual Meeting: Steven Benjamin, North Carolina, stated that he is opposed to this item, because he
10 feels it will allow device manufacturers to cut corners on “full service” devices. Tim Chesser, Arkansas, opposes this
11 item. He stated that it was a bad item, seemed incomplete, and recommended it be withdrawn.

12 This committee agrees that the item could allow subpar devices to be put into commerce, that the item itself is
13 incomplete, and recommends this item be Withdrawn.

14 CWMA 2021 Interim Meeting: Committee received updated proposal to S.2.5. and S.2.6 from Bruce Swiecicki -
15 National Propane Gas Association because technology won't be available till 2022 per manufacturers.

16
17 CWMA S&T Committee recommends item move forward as a developing item.

18 NEWMA 2021 Interim Meeting: No Comments were heard on this item. The NEWMA Specifications and Tolerances
19 Committee recommends that this item remain in Developing Status.

20 Additional letters, presentation and data may have been submitted for consideration with this item. Please refer to
21 <https://www.ncwm.com/publication-16> to review these documents.

22 **LPG-22.3 D S.2.5. Zero-Set-Back Interlock., S.2.5.2. Zero -Set-Back Interlock for**
23 ***Stationary Customer -Operated Electronic Retail Motor-Fuel Devices.***

24

25 **Source:**
26 National Propane Gas Association and U-Haul International, Inc.

27 **Purpose:**
28 The proposal will address practical issues that propane marketers encounter when trying to comply with the zero-set-
29 back requirements for propane stationary and truck-mounted meters in Handbook 44.

30 **Item Under Consideration:**
31 Amend Handbook 44, Liquefied Petroleum Gas and Anhydrous Ammonia Liquid-Measuring Devices Cod as follows:

32 ***S.2.5. Zero-Set-Back Interlock.***

33 ***S.2.5.1. Zero-Set-Back Interlock, Electronic Stationary Meters (Other than Stationary Retail Motor-Fuel***
34 ***Dispensers) and Electronic Vehicle-Mounted Meters. – A device shall be constructed so that after an individual***
35 ***delivery or multiple deliveries at one location have been completed, an automatic interlock system shall engage***
36 ***to prevent a subsequent delivery until the indicating element and, if equipped, recording element have been***
37 ***returned to their zero positions.***

38 ***[Nonretroactive as January 1, 2021]***

39 ***(Added 2019)***

40 ***(Amended 2021)***

41

1 **S.2.5.2. Zero-Set-Back Interlock for Stationary Customer-Operated Electronic Retail Motor-Fuel Devices. – A**
2 *device shall be constructed so that:*

3 *(a) after a delivery cycle has been completed by moving the starting lever to any position that shuts off the*
4 *device, an automatic interlock prevents a subsequent delivery until the indicating elements and recording*
5 *elements, if the device is equipped and activated to record, have been returned to their zero positions;*

6 *(b) the discharge nozzle cannot be returned to its designed hanging position (that is, any position where the*
7 *tip of the nozzle is placed in its designed receptacle and the lock can be inserted) until the starting lever is in*
8 *its designed shut-off position and the zero-set-back interlock has been engaged; and*

9 *(c) in a system with more than one dispenser supplied by a single pump, an effective automatic control valve*
10 *in each dispenser prevents product from being delivered until the indicating elements on that dispenser are*
11 *in a correct zero position.*

12 *[Nonretroactive as of January 1, 2017]*
13 *(Added 2016)*

14

15 **Previous Action:**

16 New

17 **Original Justification:**

18 National Propane Gas Association:

19 This proposal was developed by the National Propane Gas Association’s Technology, Standards and Safety
20 Committee, a volunteer organization comprised of 2500+ members, including propane retail marketers and others
21 providing products or services to the propane industry.

22 In S.2.5, the removal of the vehicle mounted meters from this two-minute requirement is necessary as the initiation of
23 a vehicle mounted meter is performed at the truck prior to moving the delivery hose to the customer tank, sometimes
24 as far as 150 feet from the meter, or in installations with multiple containers that may require continued adjustment of
25 containers or delivery hose to complete a delivery. This configuration can lead to periods of up to 5 minutes between
26 initial meter engagement and first container filling or between containers being filled on a single delivery.

27 In revised S.2.6, we are proposing that vehicle mounted meters be allowed periods between meter engagement and
28 product flow of greater than 2 minutes prior to automated time out initiation. A five-minute period is more practical
29 as the initiation of a vehicle mounted meter is performed at the truck prior to moving the delivery hose to the customer
30 tank, sometimes as far as 150 feet from the meter, or in installations with multiple containers that may require
31 continued adjustment of containers or delivery hose to complete a delivery. The configuration on a typical bobtail can
32 lead to periods of up to 5 minutes between initial meter engagement and first container filling or additionally periods
33 of greater than two minutes can transpire between containers being filled on a single delivery.

34 Addressing proposed new S.2.7, motor fuel, within the context of NFPA 58, refers to any container that has the
35 potential to provide propane to fuel an engine. This can include a multitude of DOT cylinders and ASME containers
36 that are not for the propulsion of an automobile. Current mechanical meter technology utilized in a standard propane
37 dispenser for the filling of portable containers, such as those utilized in NFPA 58 for motor fuel applications or those
38 that do power automobiles, are not capable of being equipped with a zero-set-back interlock and the technology will
39 not be potentially available until 2022, per meter manufacturers.

40 NFPA 58 does not currently explicitly allow the public to refuel its automobiles. All automobiles or other containers
41 must be filled by a specially trained employee. A proposed change has been introduced for consideration in the 2023
42 edition of NFPA 58 that would permit public refueling of automobiles as long as the dispensing system meets very
43 specific safety requirements, including a specialized nozzle, and is furnished with visible instructions. Upon the
44 acceptance of this new public refueling allowance the propane industry agrees that Zero-Setback-interlocks are

1 needed. These public self-service automotive dispensing systems will be listed to Underwriters Laboratories Standard
2 495 and will be dedicated to the filling of motor vehicles.

3 In view of the above information, existing dispenser systems that may only be utilized by qualified trained employees
4 should be permitted to continue operations with the existing meter technology and should not be required to include
5 Zero-Set-Back Interlocks. This should include when the dispenser is removed from one location and installed in
6 another, as long as the original meter remains functional. Existing cabinetry and controls utilized in a standard
7 dispenser cabinet generally include non-digital meters and no electronic controls with the exception of a single switch
8 that operates the pump. These simplistic designs are still effective and should not be prohibited from use in future
9 (new) installations in which the transfer process is attended by trained personnel. Limiting the scope of this section
10 will allow attended dispenser operations which are primarily utilized for filling of portable containers to remain
11 consistent in design and construction. Current use of this technology has not resulted in any known impact to the
12 consumer or over-charge situations. The term “self-operated” is used in other locations in Handbook 44 and would
13 include electronic dispensing devices and meters, which would then be consistent with the prior two sections that are
14 limited to electronic meters.

15 It is difficult to counter the arguments above. The sheer difficulties that a service person can encounter when a wet
16 hose must be carried over terrain fairly long distances between receiving containers should be sufficient justification
17 to approve this proposal. The counter argument to new S.2.7 would be that the customer may not be able to view the
18 meter to ensure it is set back to zero. The submitter requested that this be a Voting Item in 2022.

19 U-Haul International, Inc.

20 Motor fuel, within the context of NFPA 58, refers to any container that has the potential to provide propane to fuel an
21 engine. This can include a multitude of DOT cylinders and ASME containers that are not for the propulsion of an
22 automobile. Current mechanical meter technology utilized in a standard propane dispenser for the filling of portable
23 containers, such as those utilized in NFPA 58 for motor fuel applications or those that do power automobiles, are not
24 capable of being equipped with a zero-set-back interlock and the technology will not be potentially available until
25 2022, per meter manufacturers.

26 NFPA 58 currently does not allow the public to refuel its automobiles. All automobiles or other containers must be
27 filled by a specially trained employee. A proposed change has been introduced for consideration in the 2023 edition
28 of NFPA 58 that would permit public refueling of automobiles as long as the dispensing system meets very specific
29 safety requirements, including a specialized nozzle, and is furnished with visible instructions. Upon the acceptance of
30 this new public refueling allowance the propane industry agrees that Zero-Setback-interlocks are needed. These public
31 self-service automotive dispensing systems will be listed to Underwriters Laboratories Standard 495 and will be
32 dedicated to the filling of motor vehicles.

33 Most propane dispensed is for purposes other than motor-fuel. Pursuant to NFPA 58, this is accomplished by a trained
34 and certified employee dispensing propane, typically using mechanical meters, into cylinders and tanks. The
35 employee is trained and required to manually reset the meter to zero after each transaction and verify the meter is reset
36 prior to initiating a subsequent transaction. This has been and remains an accepted practice for dispensing
37 propane. This process is the industry standard for approximately 97% of all propane used in the United States. *See*
38 U.S. Department of Energy, Alternative Fuels Data Center afdc.energy.gov/fuels/propane_basics.html.

39 Unlike traditional motor-fuel, such as gasoline or diesel, customers cannot currently dispense propane into their
40 vehicles. If NFPA 58 is amended to allow customers to dispense their own propane into their vehicles and the demand
41 for propane as motor-fuel increases, the market will drive retailers to provide electronic customer-operated retail
42 motor-fuel devices to meet the demand and customer expectations for efficient and expedient fueling transactions. At
43 that time, the electronic customer-operated motor-fuel devices will certainly need to incorporate an automatic zero-
44 set-back interlock. It is simply too early in the process to effectively force mechanical retail motor-fuel devices out
45 of the market for such a small percentage of the retail propane market (approximately 3%).

1 **Comments in Favor:**

2 **Regulatory:**

- 3 • Several regulators voiced support for this item, including adding the 5 minute timeout to each section.

4 **Industry:**

- 5 • After hearing comments from the floor, the submitter understands that modifications must be made to
6 the item, in terms of numbering, to line up with the 2022 version of the handbook. The submitter also
7 now feels that a 2-minute time out may be unattainable and believes a 5 minute timeout would be
8 appropriate in each section.

9 **Advisory:**

- 10 •

11 **Comments Against:**

12 **Regulatory:**

- 13 • A regulator voiced concern with the intent and indicated that aspects of this proposal are also included
14 in LPG-22.2 and he is opposed to item, except for the 5- minute timeout being applied.

15 **Industry:**

- 16 •

17 **Advisory:**

- 18 •

19 **Neutral Comments:**

20 **Regulatory:**

- 21 •

22 **Industry:**

- 23 •

24 **Advisory:**

- 25 • NIST OWM pointed to new numbering in the 2022 version of the handbook and suggested that the
26 item under consideration be renumbered for accuracy. NIST OWM also noted that the automatic
27 timeout is currently 3 minutes in most other specifications and urged the committee to consider if it is
28 necessary in other applications.

29 **Item Development:**

30 NCWM 2022 Interim Meeting: During the committee work session, the committee reviewed a document that was
31 provided by the submitter with updated language and paragraph numbering, however, members of the committee
32 concluded the proposal was still not fully developed. The committee agreed to amend the proposal as requested by
33 the submitter. The committee recommended the submitter of this item work with the submitter of LPG-22.2 to
34 harmonize the two proposals.

35 Following the 2022 Interim Meeting, the submitters of this item and Item LPG-22.2 collaborated on a joint proposal
36 as requested. For this reason, the Committee withdrew Item LPG-22.2. See the Item under Consideration for the new
37 joint proposal.

38 For more information or to provide comment, please contact:

1 Bruce Swiecicki
2 National Propane Gas Association
3 815-806-9035m bswiecicki@npga.org

4 And

5 Konrad Pilatowicz
6 U-Haul International, Inc.
7 konrad_pilatowicz@uhaul.com

8 **Regional Associations' Comments:**

9 WWMA 2021 Annual Meeting: Bruce Swiecicki (National Propane Gas Association): This addresses two subjects:
10 has to do with zero setback, but were breaking out vehicle meters. In some situations with a bobtail where there may
11 be several tanks not close to one another and the operator has to carry the long hose.. They have to walk from tank to
12 tank. They want more time (5-minute timer). He supports this but wants to break out the systems that aren't used full
13 time for Retail motor fuel. Dwight Farr (U-Haul Program Manager): they are in support of the NPGA proposal. Tina
14 Butcher (NIST OWM): Look at the previous verbiage. The Conference did vote on changes with regard to zero setback
15 and time out in 2021. The paragraph number is different than the 2020 version.

16 The WWMA S&T Committee recommends based on testimony heard in open hearings and input from the NIST
17 advisors during the work session that this item be assigned a Developing status. The Committee also recommends
18 that the submitters of LPG-22.2 and LPG-22.3 combine their efforts to develop one of the items with consideration to
19 the 2022 version of NIST HB44.

20 SWMA 2021 Annual Meeting: Steve Benjamin, North Carolina, supports this item. This committee recommends
21 this item move forward as a Voting item.
22

23 CWMA 2021 Interim Meeting: Committee received updated proposal to S.2.5. and S.2.6 from Bruce Swieciki -
24 National Propane Gas Association because technology won't be available 2022 per manufacturers.
25

26 CWMA S&T Committee recommends item move forward as a developing item.

27 NEWMA 2021 Interim Meeting: No Comments were heard on this item. The NEWMA Specifications and Tolerances
28 Committee recommends that this item remain in Developing Status.

CWMA Report: LPG-22.3	
Regional recommendation to NCWM on item status:	
<input checked="" type="checkbox"/>	Recommend as a Voting Item on the NCWM agenda
<input type="checkbox"/>	Recommend as an Information Item on the NCWM agenda
<input type="checkbox"/>	Recommend as an Assigned Item on the NCWM agenda <i>(To be developed by an NCWM Task Group or Subcommittee)</i>
<input type="checkbox"/>	Recommend as a Developing Item on the NCWM agenda <i>(To be developed by source of the proposal)</i>
<input type="checkbox"/>	Recommend Withdrawal of the Item from the NCWM agenda <i>(In the case of new proposals, do not forward this item to NCWM)</i>
<input type="checkbox"/>	No recommendation from the region to NCWM <i>(If this is a new proposal, it will not be forwarded to the national committee by this region)</i>
Comments and justification for the regional recommendation to NCWM: (This will appear in NCWM reports)	
Konrad Pilatowicz – U-Haul International – (submitted comments via email prior to meeting) This proposal was developed by the National Propane Gas Association’s Technology, Standards and Safety Committee, a volunteer	

organization comprised of 2500+ members, including propane retail marketers and others providing products or services to the propane industry.

Addressing proposed S.2.5.2, motor fuel, within the context of NFPA 58, refers to any container that has the potential to provide propane to fuel an engine. This can include a multitude of DOT cylinders and ASME containers that are not for the propulsion of an automobile. Current mechanical meter technology utilized in a standard propane dispenser for the filling of portable containers, such as those utilized in NFPA 58 for motor fuel applications or those that do power automobiles, are not capable of being equipped with a zero-set-back interlock and the technology will not be potentially available until 2022, per meter manufacturers.

NFPA 58 does not currently explicitly allow the public to refuel its automobiles. All automobiles or other containers must be filled by a specially trained employee. A proposed change has been introduced for consideration in the 2023 20 edition of NFPA 58 that would permit public refueling of automobiles as long as the dispensing system meets specific safety requirements, including a specialized nozzle, and is furnished with visible instructions. Upon the acceptance of this new public refueling allowance the propane industry agrees that Zero-Setback-interlocks are needed. These public self-service automotive dispensing systems will be listed to Underwriters Laboratories Standard 495 and will be dedicated to the filling of motor vehicles.

In view of the above information, existing dispenser systems with mechanical registers that may only be utilized by qualified trained employees should be permitted to continue operations with the existing meter technology and should not be required to include Zero-Set-Back Interlocks. This should include when the dispenser is removed from one location and installed in another, as long as the original meter remains functional. Existing cabinetry and controls utilized in a standard dispenser cabinet generally include non-digital meters and no electronic controls with the exception of a single switch that operates the pump. These simplistic designs are still effective and should not be prohibited from use in future (new) installations in which the transfer process is attended by trained personnel. Limiting the scope of this section will allow attended dispenser operations which are primarily utilized for filling of portable containers to remain consistent in design and construction. Current use of this technology has not resulted in any known impact to the consumer or over-charge situations. The term “customer-operated” is used in several other locations in Handbook 44.

Michael Keilty – Endress+Hauser – NTEP Measuring Sector – This is a new item that the NTEP Measuring Sector has not reviewed and would like to discuss at their September 2022 meeting.

The CWMA S&T Committee recommends this moves forward as a voting item.

- 1
- 2 Additional letters, presentation and data may have been submitted for consideration with this item. Please refer to
- 3 <https://www.ncwm.com/publication-16> to review these documents.

4 **MFM – MASS FLOW METERS**

5 **MFM-15.1 D N.3. Test Drafts.**

6 **Previously MFM-2**

7 *Note: In 2019 this item was combined with Block 1 “Terminology For Testing Standards” and other items that*
 8 *addressed terminology for standards and the use of “master meters.” Based on comments heard during the 2021*
 9 *Annual Meeting, the S&T Committee recommended that all items that were combined with Block 1 “Terminology For*
 10 *Testing Standards” that originally appeared as a separate item or a separate block of items on the S&T agenda prior*
 11 *to 2019, be removed from Block 1 “Terminology For Testing Standards” and appear as originally presented.*
 12 *Item MFM-15.1 was removed from Block 1 “Terminology For Testing Standards” and now appears as a separate*
 13 *item on the 2022 Interim Meeting agenda.*

14 **Source:**

15 Endress + Hauser Flowtec AG USA

17

1 **Item Under Consideration:**

2 Amend Handbook 44, Mass Flow Meters Code as follows:

3 **N.3. Test Drafts.**

4 **N.3.1 Minimum Test** - The minimum test shall be one test draft at the maximum flow rate of the installation
5 and one test draft at the minimum flow rate. More tests may be performed at these or other flow rates. (See
6 T.3. Repeatability.)
7 (Amended 1982 **and 20XX**)

8
9 **N.3.2. Field Reference Standard Meter Test. – The minimum quantity for any test draft shall be equal**
10 **to or greater than the amount delivered in one minute at the flow rate being tested.**

11 **(Added 20XX)**

12 **Background/Discussion:**

13 This item has been assigned to the submitter for further development. For more information or to provide comment,
14 please contact:

15 Mr. Michael Keilty
16 Endress + Hauser Flowtec AG USA
17 970-586-2122, michael.keilty@us.endress.com

18 The use of transfer standards is recognized in Code sections 3.34 Cryogenic Liquid-Measuring Devices Code and 3.38
19 Carbon Dioxide Liquid-Measuring Devices Code and 3.39 Hydrogen Gas-Measuring Devices – Tentative Code.
20 Transfer standard is only defined for testing cryogenic liquid measuring devices. It has been pointed out that the term
21 transfer standard is not correct and that field reference standard meters may be more appropriate. See new the item
22 under consideration, updated on September 8, 2017.

23 Field evaluation of LPG meters and CNG dispensers and LNG dispensers is very difficult using volumetric and
24 gravimetric field standards and methods. The tolerances for these applications are such that using field reference
25 standard meters are more efficient and safer. With CNG and LNG and LPG applications, the field reference standard
26 meters are placed in-line with the delivery system as it is used to fill tanks and vehicles. The use of field reference
27 standard meters eliminates return to storage issues. The use of field reference standard meters is easier and faster
28 compared to the use of traditional field standards. The cost of using field reference standard meters and transporting
29 them is much less than the cost of traditional field provers and standards.

30 Recognition in Handbook 44 will enable States to allow field reference standard meters to place systems into service
31 and for field enforcement.

32 Volumetric field provers and gravimetric field proving are susceptible to environmental influences. The State of
33 Colorado uses a field reference standard meter to test propane delivery truck meters. The State of Nebraska has used
34 a field reference standard meter to test agricultural chemical meters. Other States have asked that there be recognition
35 in HB44 in order for their State to allow the use of field reference standard meters.

36 In some applications, field reference standard meters are not more accurate than the meters used in the application.
37 For that reason, longer test drafts and possibly more tests may need to be run.

38 The State of California is purported to have conducted a short study of field reference standard meters in the past. The
39 conclusion did not lead to wide adoption of the practice.

40 Section 3.37 Mass Flow Meters user requirement U.R.3.8. Return of Product to Storage, Retail Compressed Natural
41 Gas Dispensers requires that the natural gas which is delivered into the test container must be returned to storage. This
42 is difficult and most often not complied with when the test vessel contents are released to atmosphere. States often
43 have difficulties in remote locations finding suitable field reference equipment.

1 In the fall of 2016, Mr. Keilty provided an update to the Item under Consideration. That update appears in the agenda.
 2 The previous proposed Item under Consideration was as follows:

3 **N.3. Test Drafts. –**
 4

5 **N.3.1 Minimum Test -** Test drafts should be equal to at least the amount delivered by the device in one
 6 minute at its normal discharge rate.
 7 (Amended 1982)
 8

9 **N.3.2. Transfer Standard Test. – When comparing a meter with a calibrated transfer standard, the**
 10 **test draft shall be equal to at least the amount delivered by the device in 2 minutes at its maximum**
 11 **discharge rate.**

12 The submitter recommends that NIST update EPO 28 for CNG dispensers and EPO 26 for LPG Liquid Measuring
 13 Systems to include transfer standard meter tests. NIST Publication R 105-4 should also be revised to specifically
 14 address the transfer standard meter and the requirements for use.

15 The S&T Committee might also consider amending Sections 3.30 Liquid-Measuring Devices Code and 3.31 Vehicle-
 16 Tank Meters Code to allow transfer standard meters.

17 The Committee received written comments on all items in Block 4 and Block 5, as well as LPG-4 and MFM-2
 18 emphasizing the need for there to be more study and discussion of the issues to assess the ramifications of all the
 19 proposed changes. The Committee also received written comments from the SMA that it looks forward to further
 20 information on these items and stating that it is important to be consistent in our use of terms across multiple sections
 21 of Handbook 44. The Committee agreed to carryover this group of items on its 2019 agenda to allow for further
 22 discussion and development of these proposals.

23 **NCWM 2019 Interim Meeting:** The S&T Committee decided to combine the items on the agenda dealing with the
 24 issue of transfer standard (including items already combined into blocks) into one block. Block 1 (New) of the Interim
 25 Meeting report now includes GEN-3, Block 1 (original items from the 2019 interim agenda that appeared under Block
 26 1), Block 2, LPG-3, and MFM-5, which were all separate items and blocks of items on the S&T Committee’s 2019
 27 Interim Meeting agenda (NCWM Publication 15). Agenda items GEN-3, Block 1, Block 2, LPG-3, and MFM-5 are
 28 listed separately on the Interim agenda with a note added beneath each individual item referring the reader to the New
 29 B1 items. All items under this New B1 have retained the same numbering system for ease in referring to the appendix
 30 for discussion on each item.

31 **NCWM 2019 Annual Meeting:** Mr. Brett Gurney (NCWM Chairman) commented regarding the formation of a Task
 32 Group assigned to further develop this block proposal. The TG is charged with providing definitions for various types
 33 of standards (transfer, field, reference, etc.) as well as the criteria to be met by these types of standards. The completion
 34 date given to the TG is July 2021. The Committee agreed to the Assigned status for this block of items and looks
 35 forward to hearing updates from the TG. The Chair of the task group was:

36 Mr. Jason Glass
 37 Kentucky Department of Agriculture
 38 502-573-0282, jason.glass@ky.gov

39 **NCWM 2020 Interim Meeting:** Field Standard TG Chair, Jason Glass reported that the Task Group met prior to the
 40 Interim meeting and has begun discussion of the items under Block 1. Mr. Glass stated that bi-weekly teleconference
 41 meetings were scheduled and that the group was optimistic but had significant work to accomplish.

42 Mr. Russ Vires (SMA) supports the Scale item, SCL 18.1; in this block, Mr. Dimitri Karimov (Meter Manufacturers
 43 Association) supports the Task Group activities, Ms. Tina Butcher was encouraged with the progress on terminology
 44 and provided an update on the Mass Flow Meter testing reporting that field testing was conducted October 28 to
 45 November 1, 2019 and that State and Industry participation included Colorado, Florida, Oregon, Emerson, and Tulsa
 46 Gas Technology.

1 Mr. Kurt Floren (Los Angeles Co., CA) raised concerns with GEN-19.1. regarding the definition of “Standard, Field”
2 and its reference to “stable” standards and how long a standard is expected to be stable, which is typically 1-year, for
3 which he believes should be longer. Mr. Floren also questioned the statement in the definition “tested over a range of
4 environmental and operational conditions that the measuring devices is used...” Mr. Floren noted that he was unsure
5 if all laboratories will have the capabilities to test over this wide range of conditions. Mr. Floren also expressed
6 concerns with the definition “Standard, Transfer” citing that this standard may not meet the fundamental
7 considerations requirement for standards over a long period of time or wide range of environmental conditions.

8 Mr. Steve Harrington (OR) echoed Mr. Floren’s comments. Field Standard TG Chair Glass responded that these are
9 concerns of the TG and these issues will be discussed and considered as the TG develops these items.

10 During the Committee’s work session, the Committee agreed that this item should remain an Assigned item.

11 NCWM 2021 Interim Meeting: NCWM Field Standard TG Chair, Mr. Jason Glass (KY) provided an update on the
12 Task Group activities. Mr. Glass reported that the field standard Task Group is following the activities of the NIST
13 Master Meter Project and that the Task Group reviewed API specifications for use of master meters as a standard and
14 a test protocol that will be used to ensure uniformity in collecting data on master meters used as field standards. Mr.
15 Glass also reported that the TG does not have a recommendation for this item. Mr. Glass also reported that he would
16 be stepping down as the TG Chair. Mr. Mike Keilty (Endress+Hauser AG) thanked Chair Glass and the TG for their
17 work and requested that Block 1, LPG-15.1, N.3. and Block 1 MFM-15.1, N.3 be removed from Block 1 items and to
18 allow those items to move forward separate from the other Block 1 Items. Mr. Keilty stated that similar language was
19 added to the Hydrogen code and that the proposed language in LPG-15.1 N.3. and MFM-15.1, N.3 will allow for the
20 recognition of master meters as field standards. Mr. Henry Oppermann (W&M Consulting), stated that data is needed
21 to ensure that master meters can be used over a range of conditions. Mr. Bob Murnane (Seraphin) stated that
22 jurisdictions have the ability to use meters and that Block 1 LPG-15.1, N.3 and Block 1 MM-15.1, N.3 should remain
23 in Block 1 until data is available to support the use of master meters as a standard. Mr. Keilty mentioned that there
24 has been useful dialog regarding master meters in the TG, but that he is concerned that the TG is not close to deciding
25 and he expressed concerns with the TG’s focus on the NIST Master Meter Project. Ms. Tina Butcher (NIST OWM)
26 provided an update on the NIST Master Meter Project and noted that States have the regulatory powers to accept or
27 reject a standard. She also mentioned that NIST is working with States to collect data needed to assess master meters
28 and preliminary testing was conducted and data was collected on CNG at Tulsa Gas Technology’s facility in fall 2019.
29 Ms. Diane Lee (NIST OWM) noted that NIST OWM feels that it is premature to add more language to the NIST
30 Handbook 44 on master meters without data to support its use.

31 During the Committee’s work session, the Committee agreed to keeps all items in Block 1 and that this item should
32 remain with an Assigned status.

33 NCWM 2021 Annual Meeting: Mr. Glass reported that he would be stepping down as the Field Standard TG Chair.
34 The Committee heard updates from members of the Task Group during open hearings. Mr. Michael Keilty noted that
35 two of the items had been on the agenda since 2015 and requested that they be removed from the block and
36 recommended recognizing the use of master meters. Other comments were to keep the items together until data is
37 analyzed from the NIST Field Reference Standard Work Group to support the use of master meters but that if some
38 items were removed from the block, all items should be removed from the block. Based on comments heard during
39 the 2021 Annual Meeting, the S&T Committee recommended that all items that were included in Block 1
40 “Terminology For Testing Standards” that originally appeared as a separate item or a separate block of items on the
41 S&T agenda in and prior to 2019, be removed from Block 1 “Terminology For Testing Standards” and appear as
42 originally presented.

43 During the 2021 Committee work session the Committee recognized that the Task Group has accomplished all it is
44 able to at this point and is recommending the Task Group be disbanded and will make said recommendation to the
45 NCWM Chairman. The Committee agreed to break all items in Block 1 into individual items and designate them all
46 as Developing. The Committee thanks the Task Group and its members for their work.

47 NCWM 2022 Interim Meeting:

48 Item under consideration presented to 2022 NCWM Interim meeting as:

1 **N.3. Test Drafts.**

2 **N.3.1 Minimum Test** - The minimum test shall be one test draft at the maximum flow rate of the installation and
 3 one test draft at the minimum flow rate. More tests may be performed at these or other flow rates. (See T.3.
 4 Repeatability.)

5 (Amended 1982 **and 20XX**)

6 **N.3.2. Field Reference Standard Meter Test. – The minimum quantity for any test draft shall be equal to**
 7 **or greater than the amount delivered in one minute at the flow rate being tested.**

8 **(Added 20XX)**

9 Mr. Keilty shared a presentation on field standard meters during open hearings relevant to both MFM 15.1 and LPG
 10 15.1. The intent of the presentation was to describe initial and ongoing calibration traceability, compare OIML
 11 tolerances vs NIST Handbook 44, describe the benefits and show example. An abbreviated copy of the presentation
 12 is available on the NCWM website in the interim meeting documents archive. Mr. Keilty commented that he believes
 13 MFM 15.1 and LPG 15.1 are fully developed and should receive voting status for the annual meeting. He has updated
 14 the proposal to exclude the term “reference” from “field reference standard meter test”, as shown above. He requests
 15 that the committee provide specific guidance if a developing status is assigned. A comment from industry (Bob
 16 Murnane – Seraphin) stated that N.3.2 in the proposal conflicts with the current code which states normal test drafts
 17 must be at least one minute at the maximum discharge flow rate of installation conditions. The current wording allows
 18 for a test to be conducted at any flow rate for one minute. There was concern from a regulator (Charles Stutesman,
 19 Kansas) echoing these concerns. Diane Lee (NIST) requested that more data be made available so that NIST is able
 20 to compare worldwide data against test data compiled within the US by NIST. Mahesh Albuquerque (Colorado)
 21 expressed support for this item to receive voting status. Marc Butler (Emerson Micro Motion) expressed confusion at
 22 the two notes, thinking that perhaps they conflicted with each other; are they both needed or are they independent?
 23 Tina Butcher (NIST) expressed that she recognizes the use and importance of master meters, but is concerned with
 24 the purpose of this item. Tina suggests that the statement for use be reworked as test draft criteria is so critical. Tina
 25 recommended and offered NIST OWM assistance on this item.

26 During the S&T Committee work session, the committee recognized the submitters desire that a voting status be
 27 recommended but determined that there were too many concerns and confusion expressed. The committee
 28 recommends that the submitter develop the item further by aligning language to existing language in Handbook 44,
 29 clarifying the purpose to help avoid confusion of the new code on new equipment, and reaching out to NIST OWM
 30 or other industry or regulatory officials for feedback.

31 **Regional Associations’ Comments:**

32 **WWMA 2021 Annual Meeting:** Michael Keilty (Endress + Hauser): companion item to LPG-15.1. this is enabling
 33 language. Wants this to be a voting item in 2022. Bob Murnane (Seraphin): does not recognize the verbiage, needs a
 34 definition - see previous comments (referencing LPG-15.1, field reference standard meter). Diane Lee (NIST OWM):
 35 agree with Michael about companion item. Clarification to both items: MFM-15.1 - in HB the purpose statement is
 36 not there. In Amendment A there is already criteria there. Needed justification for language in N.3.2 - standard meter
 37 test - the min. quant. for any test draft shall be equal to or greater than am. delivered in 1 min. of the amount being
 38 tested. in CNG there is a 1/3 test being conducted. it wouldn’t even take a minute to deliver. the question was: how
 39 do you come up with 1 min. and this would not be appropriate for all master meters. Michael Keilty (Endress +
 40 Hauser): addressing Diane: in 2016 there was supposed to be a vote. NIST tech. adviser brought this up. There was a
 41 revision to the time to be extended. CNG is completely separate, EPO does say 1/3 but that was when CNG tanks
 42 were small (delivered at lower flow rate and shorter time). Mr. Wagner can verify. he made it 1 min. because N.3.1
 43 says one test draft at the max. flow rate and one at the min. flow rate of installation. The WWMA S&T Committee
 44 recommends the status remain developmental.

45 The Committee recommends that consideration be made that this item be included in Block 5, as they refer to the
 46 same terminology in HB:44. A letter was submitted to the Committee by Michael Keilty (Endress + Hauser) and will
 47 be posted to the NCWM website. NIST OWM also submitted analysis on this item which can be found at the following
 48 link on the NCWM website: <https://www.ncwm.com/annual-archive>

1 SWMA 2021 Annual Meeting: Mr. Oppermann, Seraphin, stated that this creates a conflict with the Mass Flow Meter
 2 code regarding the minimum test. He also stated that he believes this item is unnecessary, because Field Standard
 3 Tests are already specified. Mr. Keilty, Endress+Hauser, the submitter, suggested an editorial revision to some terms.
 4 He stated that he simply wants the use of master meters recognized as Field Standards and recommends tis item be
 5 oved forward as Voting with the revisions made.

6 This committee feels this item is fully developed and recommends it be moved forward as a Voting item.

7 CWMA 2021 Interim Meeting: Michael Keilty-Endress+Hauser Flow asked that the item be moved to voting and if
 8 not, asks for suggestions from the committee on how to improve item. Dr. Henry Opperman-Weights and Measures
 9 Consultants does not support the item. Says it does not explain mass flow meter as a standard and where is the data
 10 that supports this item. Tina Butcher-NIST agreed with comments from Dr. Henry Opperman. Charles Stutesman-
 11 Kansas agreed with Tina Butcher but understands the submitting of this proposal and should be moved as a voting
 12 item.

13
 14 CWMA S&T Committee recommend this item moving forward as a voting item.

15 NEWMA 2021 Interim Meeting: Michael Keilty (Endress + Hauser Flowtec) commented and recommended voting
 16 status with the changes below.

17 **N.3.2. Field Reference Standard Meter Test. – The minimum quantity for any test draft shall be equal**
 18 **to or greater than the amount delivered in one minute at the flow rate being tested.**
 19 **(Added 20XX)**

20 Rich Harshman (NIST OWM) commented and discussions were had regarding states meeting the requirement of flow
 21 time that may be less than the one minute flow in N.3.2. Michael Keilty responded that new equipment is in place
 22 and will meet the requirement in N.3.2. Henry Opperman (Weights and Measures Consulting) commented that some
 23 NTEP certs may have been issued that would not meet the N.3.2 in this proposal. The committee would like to have
 24 clarification on questions regarding the current NTEP certs and test draft sizes that are currently being used.

25 The NEWMA Specifications and Tolerances Committee recommends that this item remain in Developing Status.

CWMA Report: MFM-15.1	
Regional recommendation to NCWM on item status:	
<input checked="" type="checkbox"/> Recommend as a Voting Item on the NCWM agenda <input type="checkbox"/> Recommend as an Information Item on the NCWM agenda <input type="checkbox"/> Recommend as an Assigned Item on the NCWM agenda <i>(To be developed by an NCWM Task Group or Subcommittee)</i> <input type="checkbox"/> Recommend as a Developing Item on the NCWM agenda <i>(To be developed by source of the proposal)</i> <input type="checkbox"/> Recommend Withdrawal of the Item from the NCWM agenda <i>(In the case of new proposals, do not forward this item to NCWM)</i> <input type="checkbox"/> No recommendation from the region to NCWM <i>(If this is a new proposal, it will not be forwarded to the national committee by this region)</i>	
Comments and justification for the regional recommendation to NCWM: (This will appear in NCWM reports)	
Micheal Keilty – Endress+Hauser – Mr. Keilty presented calibration data at the 2022 NCWM Interim meeting. No recommendations from NCWM have been released. Recommended a minor change that re-includes the word “meters” because it was confusing how to apply testing requirements. Both items explain the amount of test drafts that differ from other volume standards. Field standard meter provides flexibility for use across many different products and densities. Field Standards are tested against OIML and API standards using gravimetric methods that are NIST traceable. Accuracy and repeatability are long term, it is a maintenance free system with no moving parts. These systems save time and space, contain embedded diagnostics, are easy to use, and easy to maintain. It is easy to train the operator of these systems. NMI has issued a test report on this system. Various setups can be mounted	

to a rack and easily transported. SWMA and CWMA recommended this item move forward as voting item in the 2021 Interim meeting. Recommending placing as voting today and move forward for a vote this week.

Jan Konijnenburg – NIST OWM - State and industry have a need to use various types of field test standards to evaluate commercial devices installed in the marketplace. NIST OWM recognizes the need to use various standards to test commercial devices and support the use of these standards when test data supports its use.

The NIST OWM is also supporting the use of field test standards through the purchase of several meters and the collection of data throughout the U.S.

The purpose statement for Item MFM-15.1 (Mass Flow Meters Code) indicates the goal of this item is:

“to amend Handbook 44 to allow field reference standard meters to be used to test and place into service dispensers and delivery system flow meters.”

The proposed changes in Items MFM-15.1 suggest changes to the test draft criteria for devices covered under this code, which is not necessary to allow field reference standard meters to be used to test and place into service dispensers and delivery system flow meters.

Amongst the concerns raised to the S&T Committee over the proposed changes for MFM-15.1, is the inability for an inspector or service company to test devices under their conditions of use and as required elsewhere in the MFM code.

As such, given the long debate over multiple iterations of the proposals, OWM proposes that since the purpose of the proposal is to allow field reference standard meters to be used to test and place into service dispensers and delivery system, and the responsibility for allowance of these field test standards are already addressed in the NIST Handbook 44 Fundamental Considerations and Item Block 8 clarifies these responsibilities, that Consideration be given to the proposal in Item Block 8 which clearly states the responsibility for allowance of field standards along with a new proposal to add a general code requirement. (See Item Block 8 of the NIST OWM Analysis for the S&T Annual Meeting)

OWM Recommendation OWM recommends that this item be withdrawn and that consideration be given to Item Block 8.

Mike Johnson – NE – Supports this item and agrees with Mr. Keilty. Nebraska has had great success over the last 18 years using this method. Nebraska has over 300 mass flow meters and gravimetric testing isn’t practical.

Bob Murnane – Seraphin –

The stated purpose on these proposals to amend Handbook 44 and to allow field standards meters to be used to test and place into service dispensers and delivery system flow meters. The current language adding N.3.2., has nothing to do with the purpose statement nor does have any effect at all on whether meters can be accepted or used as field standards.

Handbook 44 under fundamental considerations already allows for the use of field standards and /or equipment, as approved by the Director. There are already numerous meters in the field being used as standards that have been approved by State Directors under these fundamental considerations.

Note: Seraphin has a proposal, item OTH-22-1 that supports the Directors authority.

What is the reason and justification for N.3.2 when we already have a test draft size in N.3.1?

What data and analysis has been provided regarding the uncertainties associated with the field standard meters and the sizes of the drafts proposed in N.3.2.?

The proposal MFM-15.1., N.3.2 would impose constraints on the capability of the W&M officials to test mass flow meters.

Under the current paragraph N.3., W&M officials can conduct tests at any flow rate for any quantity that is equal to or greater than minimum measured quantity (MMQ) specified by the manufacture of the meter.

Under the proposed N.3.2., the minimum size of the test drafts must be greater than or equal to the quantity delivered in one minute at the flow rate at which the test is being conducted. Depending upon the measurement application and the test equipment available, this could substantially increase the size of the required test drafts for almost all flow rates for mass flow meters.

Example: Recently there was CNG testing performed in Colorado. The test drafts were for 1/3 of the capacity of the test cylinder (as specified in the EPO) and it took less than one minute to complete. In this case the proposed change to the size of the test draft on MFM15.1. would have prevented Weights & Measures officials from conducting the tests.

Weights and Measures officials should be able to test mass flow meters using any test draft size, equal to or greater than the MMQ over the range of flow rates. I did not do an extensive review but I did find six NTEP Certificates of Conformance that would not be able to be tested using the proposed MFM-15.1., N.3.2. What happens to them? If the proposal were adopted with its current purpose statement it could be interrupted that every meter is acceptable for use as a field standard. How do you know which meters are acceptable for use as a field standard and which ones are not? For example, if a meter is brought into the United States from another country, can it be used as a field standard. This proposal will cause confusion for both Weights and Measure officials and testing companies.

Additional Notes:

NIST and Seraphin requested Mike Keilty's participation in a meeting on these items and he declined.

There has been a total of six changes to the wording on these items since they were introduced.

Again, I would like to remind the committee that states are already using meters as field standards and this is permitted by the existing fundamental considerations. There is no need for these proposals. Seraphin Test Measures opposes items LPG-15.1. and MFM-15.1 and ask the committee to withdraw this item from consideration.

Comment: Years on an agenda are not part of criteria for deciding if an item should be made a voting item.

Charlie Stutesman – KS - Regarding Fundamental Considerations: states already have the ability to decide what's allowed. It already falls within The Director's authority, but we have other existing codes in HB44 which reference transfer standards and specifically allowing their use for testing particular devices. The NIST EPOs are still in draft status and are a resource tool only. Flow rate will be more important going forward as gravimetric testing becomes more prevalent. Recommends sending to voting status. Does this only apply to mass flow meters as the standard? NIST stated they are using Coriolis meters. But the decision to use non-mass flow meters as the field standard rests with The Director. This will apply to any meter technology, not just mass flow meters.

Michael Keilty – Endress+Hauser - Other codes in HB44 contain advice on specific test drafts when using transfer standards. These proposals give test draft advice to handle slow flow devices. The EPO for CNG testing uses small containers but the EPO can be changed.

Ivan Hankins – IA – Mr. Hankins has witnessed these tests using these transfer standards at multiple flow rates and drafts. It took much less time. This technology will allow jurisdictions to test at a quicker pace, using less staff. Supports this proposal.

Bob Murnane – Seraphin – Mr. Murnane questioned if the draft size is merely a suggestion.

The CWMA S&T Committee recommends this moves forward as a voting item.

1 Additional letters, presentation and data may have been submitted for consideration with this item. Please refer to
2 <https://www.ncwm.com/publication-16> to review these documents.

3 **MFM-22.1 V Table T.2. Accuracy Classes and Tolerances for Mass Flow Meters.**

4 **Source:**

5 NIST, Office of Weights and Measures

6 **Purpose:**

7 Currently Handbook 44, Section 3.37 Mass Flow Meters Code paragraph A.2. Vapor (Gases) recognizes
8 measurements of hydrocarbon gases, but the code is silent to this product application in Table T.2 Accuracy Classes
9 and Tolerances for Mass Flow Meters. This proposed modification to Table T.2 clarifies the tolerances the code
10 developers intended to apply to hydrocarbon gas measurements. The amendment of Table T.2. will assist officials
11 and industry by providing the exact tolerances applicable to hydrocarbon gas measurements and eliminate any need
12 to borrow tolerances established and deemed appropriate for similar gas applications in this code (i.e., compressed
13 natural gas) or from other code sections.

- 1 **Item Under Consideration:**
- 2 Amend Handbook 44, Mass Flow Meters Code as follows:

Table T.2. Accuracy Classes and Tolerances for Mass Flow Meters				
Accuracy Class	Application or Commodity Being Measured	Acceptance Tolerance	Maintenance Tolerance	Special Tolerance
.
.
2.0	- Compressed natural gas as a motor-fuel <u>- All other hydrocarbon gases and any other hydrocarbon gas/air mix applications not shown in the table</u>	1.5 %	2.0 %	2.0 %
.
.
.

- 3 **Previous Action:**
- 4 New

5 **Original Justification:**

6 Since the 1991 adoption of the Mass Flow Meters (MFM) Code the Application section of the code has recognized
 7 devices designed to dynamically measure the mass in two applications; liquids and hydrocarbon gas in the vapor state.
 8 In fact, these applications remain unchanged in the current 2020 handbook. These applications will not change with
 9 the upcoming publication of the 2022 edition of the handbook in late fall 2021.

10 Table T.2 Accuracy Classes and Tolerances for Mass Flow Meters was included in the MFM Code in 1994 in response
 11 to criticism that mass flow meters had an unfair advantage over other metering technology when used in the same
 12 product applications. Including Table T.2. in the code also resulted in corresponding requirements for marking a mass
 13 flow meter with an accuracy class to which the device is expected to perform. The tolerance table format has aligned
 14 the tolerances for similar product applications across multiple measuring device codes throughout the handbook
 15 (except in the codes for milk meters and electric vehicle fueling systems).

16 Prior to amending the MFM Code in 1994 to include the new tolerance table format there were only two applicable
 17 tolerances for MFM, they were designated paragraphs T.2 and T.3 as follows:

18 *Tolerance paragraphs T.2 and T.3 shown below were excerpted from the 1992 edition of NIST*
 19 *Handbook 44 MFM Code*

20 **T.2. Tolerances for Liquid-Measuring Devices.** – The maintenance tolerance shall be 0.5
 21 percent of the measured quantity. The acceptance tolerance shall be 0.3 percent of the measured
 22 quantity.

23
 24 **T.3. Tolerances for Vapor-Measuring Devices.** – Maintenance and acceptance tolerances for
 25 mass flow meters shall be 2.0 percent and 1.5 percent, respectively.

26 The original Acceptance Tolerance of 1.5 percent and Maintenance Tolerance of 2.0 percent applicable to gaseous
 27 products were never modified and deemed also applicable to the compressed natural gas (CNG) motor fuel product
 28 application when CNG was recognized for the first time in the MFM Code in 1994 as part of new Table T.2. Accuracy
 29 Classes and Tolerances for Mass Flow Meters. Multiple new product applications were added to the new tolerance
 30 table in the MFM Code in 1994, but these applications and products were consistent with those recognized in tolerance
 31 tables in other measuring device codes. It should be noted that the modification of the MFM tolerances in 1994 did
 32 not result in the carryover of the gas tolerances and designation of the corresponding new accuracy class to the
 33 hydrocarbon vapor product application that appeared in paragraph A.2 Vapor (Gases).

34 During the January 2021 NCWM Interim Meeting, Mr. Michael Keilty (Endress+Hauser Flow) noted that there is no
 35 specific tolerance recognized in MFM Code Table T.2 for “other gases.” Consequently, this 2022 proposal is being

1 submitted to amend the MFM Code to include the hydrocarbon vapor product application under current Accuracy
2 Class 2.0 along with CNG engine fuel because it appears hydrocarbon gases in the vapor state were inadvertently
3 overlooked in 1994 when the liquid/vapor (T.2./T.3.) tolerance paragraphs were moved into Table T.2. under a single
4 table format that specifies all tolerances applicable to mass flow meters.

5 This proposal is a housekeeping item that clarifies the originally intended hydrocarbon (HC) vapor products tolerances
6 that should have carried over from paragraph format to a new table format (Table T.2.) during the 1994 modification
7 of the NIST Handbook 44 Section 3.37 Mass Flow Meters Code. The primary intent of the 1994 amendments to the
8 code were to recognize for the first time compressed natural gas as an engine fuel when sold through a retail motor-
9 fuel dispenser. It should be noted that HC vapor products and their corresponding tolerances (i.e., Acceptance of 1.5
10 percent and Maintenance of 2.0 percent) had been recognized since the 1991 adoption of the code. Should the
11 community receive comments in opposition to or be questioned about the appropriateness of using the 1991 levels of
12 permissible error for HC vapor products; measuring device manufacturers, laboratories and regulatory officials are
13 being advised about this proposal and solicited for their input. Hearing no opposition to the proposal the community
14 can move forward to correct the 1994 oversight. Requests to include the recognition of newer product applications in
15 this proposal might be considered in 2022. However, if there is not sufficient data to support adding other products
16 to the Table T.2 tolerances at this time, it is recommended these additional new product applications become a separate
17 proposal or be revisited in 2023 or a later date.

18 The submitter requested that this be a Voting Item in 2022.

19 **Comments in Favor:**

20 **Regulatory:**

- 21 • Matt Douglas (California) supports as a voting item.

22 **Industry:**

- 23 • Michael Keilty (Endress + Hauser) is in support for voting.
24 • Marc Buttler (Emerson-Micro Motion) supports item as voting.
25 • Dimitri Karimov (Meter Manufacture Association) supports item as a voting item.

26 **Advisory:**

- 27 • Juana Williams (NIST) gave a brief explanation of the table and cleanup and expressed her support of
28 a voting status for this item.

29 **Comments Against:**

30 **Regulatory:**

- 31 • Charlie Stutesman (Kansas) opposes the item in the context of questioning whether manufactures of
32 the devices can meet the prescribed tolerances for hydrocarbon vapor meters.

33 **Industry:**

- 34 •

35 **Advisory:**

- 36 •

37 **Neutral Comments:**

38 **Regulatory:**

- 39 •

40 **Industry:**

- 41 •

1 **Advisory:**

- 2 •

3 **Item Development:**

4 NCWM 2022 Interim Meeting: Based on comments in support of this item heard during the open hearings, the
5 committee recommends this item move forward with a voting status.

6 **Regional Associations' Comments:**

7 WWMA 2021 Annual Meeting: Matt Douglas (California - DMS): The language is clarifying. CA DMS supports this
8 item. Michael Keilty (Endress + Hauser): states other gasses (hydrocarbon gasses). Solves issue with blended gasses.
9 He supports this item.

10 The WWMA S&T Committee recommends that this item be assigned a Voting status. The Committee agrees that this
11 item has merit and is fully developed.

12 SWMA 2021 Annual Meeting: Mr. Keilty, Endress+Hauser, commented that this item is a simple language cleanup
13 from NIST, and that he supports moving it forward as a Voting item.

14 This committee recommends moving this item forward as a Voting item.

15 CWMA 2021 Interim Meeting: Michael Keilty-Endress+Hauser Flow asked that item be moved to voting item.

16
17 CWMA S&T Committee recommends item move forward as a voting item.

18 NEWMA 2021 Interim Meeting: Juana Williams (NIST OWM) commented that this is a housekeeping item that adds
19 clarification. Michael Keilty (Endress + Hauser Flowtec), Lou Sakin, (Hopkinton/Northbridge, MA) and Jim Willis
20 (New York) agreed with and recommended Voting Status for this item.

21 The NEWMA Specifications and Tolerances Committee recommends that this item be moved forward with a Voting
22 Status.

CWMA Report: MFM-22.1	
Regional recommendation to NCWM on item status:	
<input checked="" type="checkbox"/> Recommend as a Voting Item on the NCWM agenda <input type="checkbox"/> Recommend as an Information Item on the NCWM agenda <input type="checkbox"/> Recommend as an Assigned Item on the NCWM agenda <i>(To be developed by an NCWM Task Group or Subcommittee)</i> <input type="checkbox"/> Recommend as a Developing Item on the NCWM agenda <i>(To be developed by source of the proposal)</i> <input type="checkbox"/> Recommend Withdrawal of the Item from the NCWM agenda <i>(In the case of new proposals, do not forward this item to NCWM)</i> <input type="checkbox"/> No recommendation from the region to NCWM <i>(If this is a new proposal, it will not be forwarded to the national committee by this region)</i>	
Comments and justification for the regional recommendation to NCWM: (This will appear in NCWM reports)	
Michael Keilty – Endress+Hauser – The proposed table T.2. mentions hydrogen. Hydrogen is a separate section. Would this apply to hydrogen mixed with CNG? Asked for explanation from NIST.	
Lisa Warfield – NIST OWM – NIST will provide clarification regarding the question about hydrogen mixing with CNG.	
The CWMA S&T Committee recommends this moves forward as a voting item.	

1 Additional letters, presentation and data may have been submitted for consideration with this item. Please refer to
2 <https://www.ncwm.com/publication-16> to review these documents.

3 **EVF – ELECTRIC VEHICLE FUELING SYSTEMS**

4 **EVF-21.1 D A.1. General**

5 **Source:**

6 ABB, BTCPower, Electrify America, Edison Electric Institute, EVConnect, EVgo, Greenlots, Rivian, Siemens, Tesla,
7 Tritium

8 **Purpose:**

9 To provide clarity on how Handbook 44, Sec. 3.4 tentative code will apply to existing EVSE that are in the ground
10 before it becomes effective by identifying which elements are non-retroactive.

11 **Item Under Consideration:**

12 Amend Handbook 44, Electric Vehicle Fueling Systems as follows:

13 **A.1. General** – This code applies to devices, accessories, and systems used for the measurement of electricity
14 dispensed in vehicle fuel applications wherein a quantity determination or statement of measure is used wholly
15 or partially as a basis for sale or upon which a charge for service is based.

16 **A.1.1 Effective Dates for DC EVSE – All DC EVSE used for commercial purposes and put into**
17 **service on or before January 1, 2023 are exempt from this standard for a period of 10 years from the**
18 **date put into service. comply**

19
20 **A.1.2 Effective Dates for AC EVSE – All AC EVSE used for commercial purposes and put into service**
21 **on or before January 1, 2022 are exempt from this standard for a period of 10 years from the date put**
22 **into service.**

23 **Previous Action:**

- 24
 - 2021: Developing Item

25 **Original Justification:**

26 While it is important to ensure that consumers are receiving accurate and transparent information regarding the
27 accuracy of EV charging stations, the cost to retrofit existing stations that often do not include an integrated meter,
28 especially DCFC where commercial DC metering technology is not readily available today, will be cost prohibitive.
29 In CA Initial Statement of Reasons (ISOR) for adopting specifications and tolerances requirement for commercial
30 EVSE, CA estimated that it costs approximately \$4,500 to upgrade existing Level 2 stations and \$20,000 to upgrade
31 existing DCFC. To put this into context, CA DMS utilized 2015 DOE data stating that the average commercial Level
32 2 EVSE costs between \$3,000-\$6,000 and the average DCFC up to \$40,000 or more. The retrofit costs would represent
33 a significant investment amount that does not seem warranted. The ISOR is available here:
34 https://www.cdfa.ca.gov/dms/pdfs/regulations/EVSE_ISOR.pdf. According to DOE AFDC station locator there are
35 23,000 level 2 station with 66,000 connectors in the U.S. and 3,700 DCFC stations with 14,000 connectors. Being
36 conservative and utilizing just the number of stations, it would cost \$92M to upgrade the existing Level 2 station in
37 the U.S. today and \$74M to upgrade the existing DCFC stations, a number that is expected to grow as more stations
38 are deployed. Placing this excessive upgrade burden on manufacturers and network operators is not feasible and an
39 alternative pathway needs to be explored to ensure consumer transparency and EVSE accuracy for existing stations
40 without requiring extensive retrofits. This number also does not include the amount of public funding across various
41 states that has been invested in these EVSE that would prematurely potentially be ripped out and replaced. It could
42 also have the unintended consequence that the EV industry stops charging for charging services at existing sites or
43 shut them down if the investment in retrofits is greater than the benefit of continuing to operate. Stranded assets across
44 the country are a valid concern and should not be taken lightly. It is important to not prematurely replace EVSE in
45 the field until the useful life of the system has been obtained. Spending a significant amount of capital to upgrade

1 existing stations rather than investing in new infrastructure does not appear aligned with EV deployment goals.
 2 Therefore, it is recommended that there is consideration for making sure requirements are non-retroactive and there
 3 is a phase in timeline for existing stations. The language utilized above is similar to what CA DMS implemented,
 4 which was the first state to adopt a version of Handbook 44 Sec 3.4 for EVSE. The date for DC EVSE is set at January
 5 1, 2023 to match California’s timeline but also because this is when DC metering technology is expected to be
 6 commercially available in the market and integrated into DC EVSE by most EVSE manufacturers that are either
 7 working on their own product or with third party meter manufacturers.

8 In general, it appears that there is some openness to considering how legacy EVSE that are in the ground today should
 9 be treated when considering that DC metering technology integrated into the EVSE was not commercially available
 10 when many of these stations were developed. The main concern that has been raised is regarding whether there should
 11 be an overall exemption for existing EVSE to the measurement provisions in HB 44 Sec 3.4 or whether existing EVSE
 12 should be exempt from certain requirements in the subsections of Sec 3.4 that are not feasible to attain. In reviewing
 13 the subsections of Sec 3.4, the proposal submitters determined that it would not be feasible to meet most subsections
 14 of Sec 3.4 with equipment that is in the ground with the exception of S.5 Marking (except S.5.2) and S.6 printing
 15 requirements. To ensure there is not confusion between which stations were in the ground prior to dates referenced
 16 above, EVSE owners and operators will need to work with local weights and measures officials on a self-reporting
 17 mechanisms or some other mechanism for tracking station service dates. CA will be the first state that will need to
 18 determine how this process will operate in the field given it has already adopted the exemption noted above and
 19 compliance for new AC stations is effective January 1, 2021. On the consumer side, EVSE operators and owners
 20 today can provide certain provisions to ensure the accuracy of the commercial transaction that can be facilitated outside
 21 of having a meter integrated into the EVSE. For instance, some owners and operators may be able to utilize the
 22 accuracy that is traceable via the measurement technology in the EV that accounts for any losses and ensure the
 23 consumer is being accurately and fairly billed for what he or she is receiving.

24 The submitter requested voting status for this item in 2021.

25 **Comments in Favor:**

26 **Regulatory:**

- 27 • 2021 Interim: Mr. Samuel Ferris (California) supported Developing status but noted that an exemption
 28 from requirements in the handbook is not common and that the life span of the equipment may only be
 29 seven to ten years.
- 30 • 2022 Interim: A regulator from Nevada supports developing status.
- 31 • 2022 Interim: A regulator from New York supports developing status and looks forward to reasonable
 32 modifications of the proposal by the submitter. He does not favor a 10-year grace period and wishes
 33 for a permanent code status.

34 **Industry:**

- 35 • 2021 Interim: Ms. Francesca Wahl (Tesla) and Mr. Keith Bradley (Electrify America) supported
 36 Developing status.
- 37 • 2021 Interim: Ms. Francesca Wahl (Tesla) supported this item.
- 38 • 2021 Interim: Mr. Kevin Miller (Charge Point) expressed concerns with allowing an exemption for 10-
 39 years and equipment should be able to meet the requirements and supports a Developing status for this
 40 item.
- 41 • 2021 Annual: Ms. Francesca Wahl (Tesla) noted that she will be working to incorporate feedback and
 42 will work with the EVF National Work group to develop an updated proposal. Ms. Wahl also provided
 43 a letter to the S&T Committee concerning the Developing status for this item.
- 44 • 2022 Interim: A member of the submitting group recommends developing status and provided
 45 background and stated they are working on revised draft for proposal. The submitters worked with NIST
 46 OWM and EVFE Subgroup for feedback. The commentor stated a revised proposal will be developed
 47 and noted there are significant modifications from the original proposal.
- 48 • 2022 Interim: A member of industry representing Electrify America, commented section 3.40 in
 49 Handbook 44 was developed before the company was established. A revised proposal is expected to be
 50 submitted. Recommends the item remain a developing item.

- 1 • 2022 Interim: A member of industry representing EVgo, a joint submitter recommends developing
2 status.

3
4 **Advisory:**

- 5 • 2022 Interim: No Comments

6
7 **Comments Against:**

8 **Regulatory:**

- 9 • 2022 Interim: A regulator from California DMS recommends withdraw, however stated a developmental
10 status is acceptable.
11 • 2022 Interim: A regulator from New York would like to see a permanent code in the area EVFSs and
12 stated the 10-year exempt period is not acceptable. The commentor stated he is supportive of seeing
13 reasonable changes from the joint submitters.

14
15 **Industry:**

- 16 • 2022 Interim: A member of industry representing ChargePoint is not in support of this item and
17 recommends withdraw. He stated the proposal signals to the market things are in flux and supports
18 removal of the proposal and tentative code status. The industry member noted the recent passage of the
19 law providing \$7.8 billion in funding to invest in U.S. EV charging.

20
21 **Advisory:**

- 22 • 2021 Interim: Ms. Diane Lee (NIST OWM) noted that the proposal is not clear as written and expressed
23 concerns with an exemption for 10 years.
24 • 2021 Annual: Ms. Juana Williams (NIST OWM), stated that it was unclear as to the exact type of use
25 that entitles an EVSE to an exemption to NIST HB 44 requirements. Ms. Williams also pointed out that
26 the exemption would allow a generation of devices to operate for 10-years without have to comply with
27 the requirements and could be viewed as competitively unfair to traditional or other alternative vehicle
28 fueling applications.
29 • 2022 Interim: An advisory member representing NIST OWM stated the current proposal conflicts with
30 the general code for the term retroactive. The representative stated the submitters of the item discussed
31 an alternative proposal with NIST OWM and they are awaiting a final draft of this alternative proposal.

32
33 **Neutral Comments:**

34 **Regulatory:**

- 35 • 2022 Interim: No Comments

36
37 **Industry:**

- 38 • 2022 Interim: No Comments

39
40 **Advisory:** 2022 Interim: No Comments

41 **Item Development:**

42 NCWM 2021 Interim Meeting: The committee assigned Developing status for this item. For more information or to
43 provide comment, please contact:

44 Ms. Francesca Wahl
45 Tesla
46 650-435-0422, fwahl@tesla.com

47 The Committee suggests that the submitters of this item consider the responses to the proposal from the regional
48 meetings, NIST, OWM and EVFS work group and update the item under consideration to address the comments and
49 as necessary prepare a revised proposal for the EVFS work group to address the concerns with this item.

1 NCWM 2022 Interim Meeting: The Committee maintained developing status for this item. The Committee suggests
 2 the submitters take into consideration the comments provided during open hearings and prepare a revised draft
 3 proposal to NIST OWM, the EVFE Subgroup, etc. to provide a comprehensive proposal to membership.

4 **Regional Associations’ Comments:**

5 WWMA 2021 Annual Meeting: Justin Wilson (ChargePoint): in the notes for 2021(Interim) there is an error: the
 6 notations are incorrect. They recommend withdraw of this proposal. They think the flexibility should be provided to
 7 state officials. Kevin Schnepf (California - DMS): extended exemptions are not appropriate - this is still tentative.
 8 This should be withdrawn.

9 The WWMA S&T Committee recommends this item be Withdrawn. The Committee makes this recommendation
 10 based on testimony heard during the open hearings and previous reports including recommendations from other
 11 Regions.

12 SWMA 2021 Annual Meeting: The committee received no comments on this item. This committee recommends this
 13 item be Withdrawn due to the item allowing a 10-year exemption.

14 CWMA 2021 Interim Meeting: Tina Butcher-NIST has not seen a revised proposal from the submitters. Submitters
 15 recommend item stay developing.

16
 17 CWMA S&T Committee recommends item stay developing.

18 NEWMA 2021 Interim Meeting: Francesca Wahl (Tesla) speaking on behalf of the submitters group of EVSE
 19 companies asked for further development as the submitters work with the national work group to develop language
 20 that will satisfy regulators in-regards to time frames of implementation dates. Alex Beaton from EV GO supported
 21 Francesca’s comments and supports a development status. Juana Williams (NIST OWM) commented in-regards to
 22 blanket exemptions that release devices from compliance for such an extended period-of-time seemed too long. (see
 23 NIST comments on NCWM website)

24 The NEWMA Specifications and Tolerances Committee recommends that this item remain in Developing Status.

CWMA Report: EVF-21.1
Regional recommendation to NCWM on item status:
<input type="checkbox"/> Recommend as a Voting Item on the NCWM agenda <input type="checkbox"/> Recommend as an Information Item on the NCWM agenda <input type="checkbox"/> Recommend as an Assigned Item on the NCWM agenda <i>(To be developed by an NCWM Task Group or Subcommittee)</i> <input checked="" type="checkbox"/> Recommend as a Developing Item on the NCWM agenda <i>(To be developed by source of the proposal)</i> <input type="checkbox"/> Recommend Withdrawal of the Item from the NCWM agenda <i>(In the case of new proposals, do not forward this item to NCWM)</i> <input type="checkbox"/> No recommendation from the region to NCWM <i>(If this is a new proposal, it will not be forwarded to the national committee by this region)</i>
Comments and justification for the regional recommendation to NCWM: (This will appear in NCWM reports)
Francesca Wahl – Tesla - Working with NIST EVFE Subgroup to revamp proposal and focusing on DC. Wants to remain development status. Supports current HB44 3.40 tentative code acceptance in the very near future. The CWMA S&T Committee recommends this item remain as a developing item per the request of the submitter.

25 Additional letters, presentation and data may have been submitted for consideration with this item. Please refer to
 26 <https://www.ncwm.com/publication-16> to review these documents.

1 **EVF-20.1 V S.1.3.2. EVSE Value of the Smallest Unit.**

2 *NOTE: The item under consideration includes editorial changes by the submitter, NIST, OWM, to correctly reflect*
3 *the appropriate strikeout/underlines when editing existing text in NIST HB 44. NIST OWM included other*
4 *recommendations for changes to the text in their analysis, but these changes were more than editorial.*

5 **Source:**

6 NIST, Office of Weights and Measures

7 **Purpose:**

8 Specify the maximum permissible value of the indicated and/or recorded electrical energy unit by an EVSE. Establish
9 a value for the energy unit of measurement (kilowatt-hour) that is: suitable for all commercial transactions and does
10 not significantly lengthen the time (by a factor of 25) to conduct a test of an EVSE.

11 **Item Under Consideration:**

12 Amend Handbook 44, Electric Vehicle Fueling Systems follows:

13 **S.1.3. EVSE Units.**

14 ~~**S.1.3.2. EVSE Value of Smallest Unit.** The value of the smallest unit of indicated delivery by an EVSE,~~
15 ~~and recorded delivery if the EVSE is equipped to record, shall not be greater than 0.0005 MJ or~~
16 ~~0.0001 kWh.~~

17 ~~(Amended 2020)~~

18 **S.1.3.2. EVSE Value of Smallest Unit.** – The value of the smallest unit of indicated delivery by an
19 EVSE, and recorded delivery if the EVSE is equipped to record, shall be 0.005 MJ or 0.001 kWh.;

20 (a) for AC and DC systems shall not exceed 0.0005 MJ or 0.0001 kWh; and

21 (b) the value in electrical energy units in terms of:

22 (1) the megajoule (MJ) shall be expressed as a decimal multiple or submultiple of 5; or

23 (2) the kilowatt hour (kWh) shall be expressed as a decimal multiple or submultiple of 1.

24 (Amended 2020)

25 **Background/Discussion:**

26 This item has been assigned to the submitter for further development. For more information or to provide comment,
27 please contact:

28 Ms. Juana Williams

29 NIST, Office of Weights and Measures

30 301-975-3989, juana.williams@nist.gov

31 In 2014 the U.S. National Work Group (USNWG) on Electric Vehicle Fueling and Submetering (EVFS) deliberated
32 about the Electric Vehicle Fueling System’s appropriate value for the display of electrical energy when sold in
33 kilowatt-hour units of measurement. Based on the typical EVSE’s ratings (i.e., charging power and current) the work
34 group agreed that the value of the indicated or recorded charge should be in increments of 0.001-kilowatt hour (kWh).
35 Members of the work group noted that the value could be inexpensively modified. Most recently it has been
36 determined that the currently specified value of 0.001 kWh for the electricity unit of measurement in relation to the
37 time for a test standard to complete an accuracy test at 10 % of the maximum deliverable amperes increases the length
38 of the test by a factor of 25.

39 Each Handbook 44 code specifies the appropriate unit(s) of measurement (indicated and recorded) that is permitted
40 for all device applications that a code applies to. The accepted SI (metric) unit of measurement for a device application
41 in each code is in most cases followed by its equivalent corresponding recognized U. S. customary unit. Measurements
42 in SI or customary units can be supported through calibrations by an accredited (or recognized) laboratory. Each
43 handbook code also specifies the maximum value for a unit of measurement that can be indicated or recorded by the
44 device for a specific product application or rate of delivery.

1 Unlike the scales' codes, the EVSE code specifies the "smallest" value of the unit that is permitted to be indicated for
 2 the quantity of electricity being measured; whereas the scales codes specify the value that the unit *shall be equal to* or
 3 *shall not be greater than*. The language in the scales code clearly states that there is only one acceptable value for the
 4 unit of measurement or establishes a value that the unit cannot exceed.

5 The measuring devices codes specify that the smallest value for the unit of delivery indicated or recorded for a
 6 commodity *shall not exceed* a specific value. The value varies depending on the type of commodity and/or device's
 7 flow rate or falls into the category of all other meters. Yet it is clear the unit of measurement's value cannot be
 8 exceeded although lesser values are acceptable if the device has that capability, maintains accuracy, and sales in that
 9 particular indicated or recorded quantity are appropriate.

10 To provide adequate resolution (i.e., value of the kWh unit) in the EVSE's customer display of the electrical energy
 11 transaction information and to facilitate accuracy testing of the system two alternate proposals were developed that
 12 recommend somewhat different modifications of paragraph S.1.3.2. EVSE Value of Smallest Unit.

13 The first option for modifying the code that was developed and circulated to the Electric Vehicle Fueling Equipment
 14 (EVFE) Subgroup for consideration would be to recognize EVSEs equipped with a customer display of 0.005 MJ or
 15 0.001 kWh and a test mode display on the EVSE face, accessible internally, or activated by controls accessed by the
 16 official that indicates in 0.0005 MJ or 0.0001 kWh increments.

17 Also, part of the information circulated to the Subgroup included a second option of modifying the value of the
 18 displayed and/or recorded kilowatt-hour energy units from 0.005 MJ or 0.001 kWh to a higher resolution of 0.0005
 19 MJ or 0.0001 kWh. The first option shown below would modify paragraph S.1.3. EVSE Units to include a new
 20 subparagraph S.1.3.3. EVSE Value of Smallest Unit Test Mode to allow for a higher resolution value of the kilowatt-
 21 hour indications as a test mode display separate from the display used for the display transaction. The test mode
 22 display would either continuously indicate on the face of the dispenser or an internal display accessible during the
 23 inspection and test of the dispenser or display the quantity by using controls on the device.

24 **S.1.3. EVSE Units.**

25 **S.1.3.3. EVSE Value of Smallest Unit Test Mode. – EVSE shall display the electricity measured for**
 26 **each transaction in 0.0005 MJ or 0.0001 kWh energy units through:**

- 27 (a) **a continuous indication on the face of the EVSE;**
- 28 (b) **an internal display accessible during the inspection and test of the EVSE; or**
- 29 (c) **a display of the quantity by using controls on the device.**
- 30 **(Added 20XX)**

31 **S.1.3.34. Value Defined. ...**
 32 **(Amended 2020)**

33 A test display mode is permissible for the mass flow meter compressed natural gas and liquefied natural gas dispenser
 34 applications. Although this option was entertained by the USNWG in 2014, further discussion would be needed to
 35 provide guidelines on how the indication must operate to comply with handbook requirements. When this option was
 36 circulated in 2019 to the USNWG EVFE Subgroup, the interest was more in favor of a single higher resolution display
 37 (i.e., 0.0001 kWh). However, there was some concern expressed about potential rounding issues were there to be two
 38 separate indications having different display resolution.

39 Since the 2015 adoption of Handbook 44, Section 3.40 paragraph S.1.3.2. EVSE Value of Smallest Unit has specified
 40 that the smallest unit of indicated delivery by an EVSE, and recorded delivery if the EVSE is equipped to record, shall
 41 not be greater than 0.005 MJ or 0.001 kWh. It is anticipated that the community would question the cost to modify
 42 the equipment's design; however, after discussions about the possible quantity value of "d" as large as 0.1 kWh,
 43 industry indicated that the value for the unit of measurement could be inexpensively modified. The EVSE code has

1 tentative status and to date no equipment has undergone the type evaluation process. The community anticipates there
2 will be slight modifications to requirements and test procedures to address various generations of equipment, design
3 configurations, and business models in the marketplace.

4 NCWM 2020 Interim Meeting: Ms. Tina Butcher (NIST OWM) reported that this item was submitted by NIST OWM
5 to modify the value for “d” specified for Kilowatt-hour for EVSEs to recommend a higher resolution for “d” that does
6 not significantly lengthen the time to conduct the accuracy test of EVSE. Ms. Butcher added that it is uncertain if the
7 item is fully developed and request it be made developing. Mr. Kevin Schnepf (CA) stated California has already
8 made the change, however he supports a Developing status for this item. Mr. Jim Willis (NY) provided similar
9 comments to those of Mr. Schnepf. *NOTE: The NIST OWM analysis includes a recommended that the phrase “shall*
10 *not be greater than” be removed.*

11 During the Committee’s work session, the committee agreed that this item should be given a Developing status to
12 allow the submitter to continue to work with the work group concerning this item.

13 NCWM 2021 Annual Meeting: Ms. Juana Williams explained that NIST OWM recommends the community
14 reconsider the original proposed modifications of paragraph S.1.3.2 which do not limit the electrical energy unit to
15 being expressed only as a single fixed numerical value but permit a manufacturer to design a display that measures in
16 a numerical value of 0.0005 MJ or 0.0001 kWh or some other numerical value as long as the chosen value does not
17 exceed those MJ or kWh maximum values specified in paragraph S.1.3.2. Whatever, the quantity unit value it would
18 remain unchangeable during the commercial use of the system or dispenser. Proposed new paragraph S.1.3.X.
19 Expressed Value of EVSE Electrical Energy Unit will clarify the value of the quantity unit shall only be expressed as
20 either decimal multiples or submultiples of the numbers 1, 2, or 5 as shown below.

21 **S.1.3.X. Expressed Value of EVSE Electrical Energy Unit. – The electrical energy unit value shall be**
22 **a decimal multiple or submultiple of 1, 2, or 5.**

23 The Committee recommended a Developing status for this item.

24 **Comments in Favor:**

25 **Regulatory:**

- 26 • 2022 Interim Meeting: A regulator from California DMS supports as voting with NIST OWM edits.

27 **Industry:**

28 **Advisory:**

- 29 • 2022 Interim Meeting: The submitter from NIST OWM commented California, New York, and Ohio
30 are currently testing AC systems and should have resolution to sufficiently test these devices. She added
31 California is currently requiring a 0.0001 kWh and has issued eleven type approvals on these devices
32 with this requirement, noting DC systems are not inspected as this time and there is little data on these
33 systems. The advisory member provided a summary of OWM’s written analysis and referred
34 membership to OWM’s latest alternate proposals by OWM. She also noted the kWh and MJ value is
35 limited to decimal multiples or submultiples of 1 or 5, respectively, and would allow the option of a
36 maximum unit value indicated to three decimal places for DC EVSEs, but only four decimal places in
37 all cases for AC EVSEs.

38 **Comments Against:**

39 **Regulatory:**

- 40 • 2022 Interim Meeting: A regulator from New York commented the MMQ should be based on time and
41 not on the number of decimal places or resolution, the time of the test is unchanged. He commented this
42 is not a necessary based on New York State’s testing of these units.

43 **Industry:**

- 44 • 2022 Interim Meeting: A member of Electrify America stated there is no need to assure consistency with
45 California EV code and does not see the importance of the resolution as it does not affect the speed of
46 the test. This issue is more applicable to AC rather than DC.

1 **Advisory:**

2 **Neutral Comments:**

3 **Regulatory:**
 4 **Industry:**
 5 **Advisory:**

6 **Item Development:**

7 The Committee has considered the three options provided by the submitter, NIST OWM. Proposal 1, as it appears in
 8 Publication 15 and the two alternative proposals published in NIST OWM’s written analysis. The Committee has
 9 considered the three proposals and has agreed the item is fully developed and is supported by current AC EVSEs in
 10 commercial use. The Committee understands there may be more data available at the time of vote providing additional
 11 information on the value of the smallest unit in DC EVSE systems. The Committee agreed with recommendations that
 12 Proposal 1, which appeared in the Item Under Consideration in the January 2022 S&T Agenda and shown below,
 13 should be further modified to clarify the permissible numerical values for expressing the unit of measurement (i.e.,
 14 MJ or kWh):

15 **S.1.3. EVSE Units.**

16 **S.1.3.2. EVSE Value of Smallest Unit.** – The value of the smallest unit of indicated delivery by an EVSE, and
 17 recorded delivery if the EVSE is equipped to record, shall not be **greater than 0.0005 MJ or 0.0001 kWh.**
 18 **(Amended 2020)**

19 Committee has assigned a voting status for the item as shown below at the 2022 Annual Meeting. This alternate
 20 proposal replaces Proposal 1 in the Item Under Consideration to read as follows:

21 **S.1.3.2. EVSE Value of Smallest Unit.** – **The value of the smallest unit of indicated delivery by an**
 22 **EVSE, and recorded delivery if the EVSE is equipped to record, shall be 0.005 MJ or 0.001 kWh.;**
 23 **(a) for AC and DC systems shall not exceed 0.0005 MJ or 0.0001 kWh; and**
 24 **(b) the value in electrical energy units in terms of:**
 25 **(1) the megajoule (MJ) shall be expressed as a decimal multiple or submultiple of 5; or**
 26 **(2) the kilowatt hour (kWh) shall be expressed as a decimal multiple or submultiple of 1**

27 **Regional Associations’ Comments:**

28 WWMA 2021 Annual Meeting: Kevin Schnepf (California - DMS): Supports this item. This was adopted in
 29 California and helped in time of testing. It would be beneficial to all (less timely). In support. Tina Butcher (NIST
 30 OWM): Echoes what Kevin Schnepf indicated: the proposed change will align with California standards - no
 31 alternative suggestions have been made yet. Move to a vote to get in alignment.

32 The WWMA S&T Committee recommends that this item be assigned a Voting status. The Committee agrees that this
 33 item has merit and is fully developed.

34 SWMA 2021 Annual Meeting: The committee received no comments on this item. This committee recommends the
 35 item move forward as a Voting item.

36 CWMA 2021 Interim Meeting: Diane Lee-NIST and Tina Butcher-NIST recommend this item for voting as it is in
 37 line with California.

38 CWMA S&T Committee recommends this item as a voting item.

39 NEWMA 2021 Interim Meeting: Jim Willis (New York) commented in-regards to the value of the smallest unit. NY
 40 has tested many charging stations that have a resolution to the thousands place and have not experienced any issues
 41 with this. The additional decimal place in New York’s opinion is not needed and may place an unneeded requirement
 42 for some companies in the industry. Juana Williams (NIST OWM) commented that the proposed change aligns the

1 requirement with those already adopted and in use by the California Division of Measurement Standards. This
 2 alignment is needed to ensure consistency in inspection and testing of Electric Vehicle Fueling Systems in both type
 3 evaluation and field inspection and testing. NIST OWM notes that the NIST U.S. National Work Group has discussed
 4 the possibility that additional changes may be needed to this paragraph; however, no specific recommendations have
 5 been suggested to this point and do not appear to be imminent. Thus, to avoid inconsistencies noted above and delays
 6 in inspecting and testing this equipment, the Committee may wish to move this item forward for a vote. Jim Willis
 7 (New York) commented that alignment with California is not a reason to change something that is working as intended.
 8 And that New York does not believe this change is necessary.

9 The NEWMA Specifications and Tolerances Committee recommends that this item move forward as a Voting item.

CWMA Report: EVF-20.1
<p>Regional recommendation to NCWM on item status:</p> <p><input checked="" type="checkbox"/> Recommend as a Voting Item on the NCWM agenda <input type="checkbox"/> Recommend as an Information Item on the NCWM agenda <input type="checkbox"/> Recommend as an Assigned Item on the NCWM agenda <i>(To be developed by an NCWM Task Group or Subcommittee)</i> <input type="checkbox"/> Recommend as a Developing Item on the NCWM agenda <i>(To be developed by source of the proposal)</i> <input type="checkbox"/> Recommend Withdrawal of the Item from the NCWM agenda <i>(In the case of new proposals, do not forward this item to NCWM)</i> <input type="checkbox"/> No recommendation from the region to NCWM <i>(If this is a new proposal, it will not be forwarded to the national committee by this region)</i></p>
<p>Comments and justification for the regional recommendation to NCWM: <i>(This will appear in NCWM reports)</i></p> <p>No comments from the floor.</p> <p>The CWMA S&T Committee recommends this moves forward as a voting item.</p>

10 Additional letters, presentation and data may have been submitted for consideration with this item. Please refer to
 11 <https://www.ncwm.com/publication-16> to review these documents.

12 **EVF-21.5 D T.2. Load Test Tolerances.**

13 **Source:**

14 ABB, BTCPower, Electrify America, Edison Electric Institute, EVConnect, EVgo, Greenlots, Rivian, Siemens, Tesla,
 15 Tritium

16 **Purpose:**

17 To create separate metering requirements for DC EVSE due to significant technology differences and challenges
 18 between AC and DC systems.

19 **Item Under Consideration:**

20 Amend Handbook 44, Electric Vehicle Fueling Systems as follows:

21 **T.2. Load Test Tolerances.**

22 **T.2.1. AC EVSE Load Test Tolerances.** – The tolerances for **AC** EVSE load tests are:

23 (a) Acceptance Tolerance: 1.0 %; and

1 (b) Maintenance Tolerance: 2.0 %.

2 **T.2.2. DC EVSE Load Test Tolerances. – The tolerances for DC EVSE load tests:**

3 (a) **Devices installed prior to January 1, 2033**

4 i. **Acceptance Tolerance: 2.5 %; and**

5 ii. **Maintenance Tolerance: 5.0 %**

6 (b) **Devices installed January 1, 2033 or later**

7 i. **Acceptance Tolerance: 1.0 %; and**

8 ii. **Maintenance Tolerance: 2.0 %**

9 **Previous Action:**

- 10 • 2021: Developing Item

11 **Original Justification:**

12 Proposed changes to the text to differentiate alternating current (AC) EVSE from direct current (DC) EVSE. Metering
 13 for DC architected systems is considerably more complicated and in ways that the original drafting of this provision
 14 never contemplated. For example, the tentative code when initially written never contemplated 350kW EVSE or liquid
 15 cooled cabling from the charging post to the connector. As such, it is necessary to separate the implementation dates
 16 of some of the specifications, tolerances, and other technical requirements. DC metering solutions are still being
 17 researched and developed and are not yet commercially available to be integrated into DC chargers at scale and at
 18 reasonable cost. While the supply chain for the physical meters themselves is slowly catching up, the metering system
 19 in a DC EVSE, particularly high-power DC EVSE that utilize liquid-cooled cables, goes beyond the physical meter
 20 itself which is incorporated in the main housing of the EVSE. For example, measurements may also need to be taken
 21 at the connector end of the dispenser and software and algorithms must be developed, validated, and integrated into
 22 the EVSE system to allow for accurate metering of kWh delivered to the vehicle. Implementing more complex
 23 metering systems needed for DCFC requires significant design and manufacturing changes to DC EVSE.

24 The proposed tolerances account for the fact that these systems are still in development and are untested. The proposed
 25 timeline provides the industry with enough time to develop, test, validate, and deploy reliable DC metering system
 26 technology. This timeline is also consistent with the timeline approved by the State of California which accounts for
 27 the vast majority of the EVSE market. EVSE manufacturers are working diligently to meet the California timeline and
 28 are confident that it can be met.

29 While it is important to ensure that consumers are receiving accurate and transparent information regarding the
 30 accuracy of EV charging stations, it is also important that the technology to deliver high accuracy is available and
 31 reliable.

32 There is concern about both the proposed timeline and the accuracy requirement. Some are concerned that the accuracy
 33 specification of 2.5% acceptance and 5% maintenance is too high and does not provide sufficient consumer confidence
 34 that all charge sessions are equal regardless of provider and station. The proposers would note that this is a new and
 35 evolving technology where charging providers place a premium on customer experience as they compete for this
 36 growing market. Thus far, customers have not registered complaints about lack of transparency. Some are concerned
 37 that the timeline for instituting a metering regime is too far into the future. The proposers acknowledge the few years
 38 it will take to have reliable DC metering systems commercially available at scale but are working as quickly as possible
 39 to develop and integrate these systems into their chargers. Some are also concerned that the metering requirements
 40 have been in a place for several years already and therefore the EVSE community should not need more years to
 41 develop solutions. The proposers note that current DC EVSE technology was never contemplated by the existing
 42 metering regime and DC technology, particularly high-power DC EVSE, were not in existence at the time the original

1 specifications were set. For example, the first 350kWh EVSE with liquid cooled cables weren't deployed in the US
2 until 2018.

3 The submitter requested voting status for this item in 2021.

4 **Comments in Favor:**

5 **Regulatory:**

- 6 • 2021 Interim: Recommended Developing status.
- 7 • 2022 Interim: A regulator from Nevada supports developing status.

8
9 **Industry:**

- 10 • 2021 Interim: Mr. Michael Krauthamer (AFTE) and Mr. Keith Bradley (Electrify America), supported
11 the item and recommended Developing status.
- 12 • Annual 2021: The submitters requested to maintain Developing status.
- 13 • 2022 Interim: A member of the submitting group recommends the item remain developing. The
14 commentor stated the group will be submitting a revised proposal addressing comments and feedback
15 received.

16
17 **Advisory:**

- 18 • 2022 Interim: No comments

19
20 **Comments Against:**

21 **Regulatory:**

- 22 • 2022 Interim: A regulator from California DMS recommends the item to be withdrawn.

23
24 **Industry:**

- 25 • Interim 2021: Mr. Samuel Ferris (CA) recommended a Developing status for this item. Mr. Kevin
26 Miller (Charge Point) recommended that this item be withdrawn and noted that his devices meet the
27 tolerance in NIST HB 44.
- 28 • 2022 Interim: A member of industry representing ChargePoint recommends withdraw of this item due
29 to no details of the 2022 alternate proposals recently developed by the submitters.

30
31 **Advisory:**

- 32 • 2022 Interim: An advisory member representing NIST OWM reiterated 2021 comments against
33 blanket exemptions and dual tolerances yet awaits the rework of alternate proposals recently developed
34 by the submitters that would be ready to be revisited in future EVFE Subgroup meetings. The member
35 encourages the submitters to work with NIST OWM on the final draft of any proposed changes.

36
37 **Neutral Comments:**

38 **Regulatory:**

- 39 • 2022 Interim: No comments

40
41 **Industry:**

- 42 • 2022 Interim: No comments

43 **Advisory:**

- 44 • 2022 Interim: No comments

1 **Item Development:**

2 2021 Interim Meeting: The Committee assigned Developing status for this item. For more information or to provide
 3 comment, please contact:

4 Mr. Asaf Nagler
 5 ABB
 6 202-639-4075, asaf.nagler@us.abb.com

7 NCWM 2022 Interim Meeting: During the committee work session this item was assigned Developing status. The
 8 Committee suggests the submitters take into consideration the comments provided during open hearings. The
 9 Committee recommends the submitter work with NIST OWM on the final draft of their 2022 alternate proposal for
 10 review and comments.

11 **Regional Associations' Comments:**

12 WWMA 2021 Annual Meeting: Kevin Schnepf (California - DMS): this was adopted in California Regulation. Just
 13 this past week (September 23rd, 2021) a complete analysis was done and clearly identified that they can meet the 1%
 14 tolerance. Recommends to be withdrawn. Justin Wilson (ChargePoint): Recommend to be withdrawn - equipment
 15 can meet tolerance as is. Keith Bradley (Electrify America): there are two questions: 1 - can devices in near term meet
 16 the tolerance? They are concerned with: when did this become possible? They are continuing to work on this. They
 17 are not urging changes to this item - they are working on it. Wants to leave it in developing status - more work to be
 18 done. Kurt Floren (LA County): when equipment is out there that is meeting the standards, this is not the time to roll
 19 back.

20 The WWMA S&T Committee recommends this item be Withdrawn. The Committee makes this recommendation
 21 based on testimony heard during the open hearings and previous reports including recommendations from other
 22 Regions.

23 Note: In the voting session, Cadence Matijevich (NV) requested that the recommendation of withdrawal of this item
 24 be changed to developing. The Committee reviewed item EVF 21.5 with consideration to the comment heard during
 25 the voting session. It is the position of the Committee based on open hearings and regional input to recommend
 26 withdraw of the item. The testimony provided during open hearings supported that devices can meet the current
 27 tolerances.

28
 29 The Committee's charge is to recommend a status to the National S&T Committee, this will not eliminate the item
 30 from the agenda, it is our recommendation.

31 SWMA 2021 Annual Meeting: The committee received no comments on this item. This committee recommends this
 32 item be Withdrawn because we believe that current tolerances are attainable.

33 CWMA 2021 Interim Meeting: Diane Lee-NIST noted that there were comments regarding this item on the NCWM
 34 website.

35 CWMA S&T Committee recommends this item be withdrawn.

36 NEWMA 2021 Interim Meeting: Francesca Wahl (Tesla) representing the submitting group commented and was
 37 supported by Alex Beaton (EV GO) in-regards to a study and follow up webex meeting from Argonne National Lab.
 38 In-order to follow up on this study, the submitters are asking for a developing status. Juana Williams commented
 39 below and comments can also be found on the NCWM website.

- 40 1. NIST OWM asks if there are existing devices that can meet the current requirements? If there are, what are
 41 the justifications for proposing the relaxing of the tolerances, particularly without a sunset date (i.e., a
 42 retroactive date)?
- 43 2. From a technical perspective, OWM would be less reluctant to seeing the adoption of a phase-in date that
 44 includes an accompanying sunset date (i.e., a retroactive date). OWM asks what concrete issues can be cited
 45 by the submitters to counter any opposing arguments for a phase in period for DC systems? It would be

- 1 important to have statistics on the population of devices not in compliance with requirements as discussion
2 moves forward on this proposal.
- 3 3. This is not a typical practice to be done on an unlimited basis. This would be more palatable from both a
4 competitive and enforcement standpoint if there are specific technical issues, that necessitate and justify
5 relaxing tolerances on an industrywide basis. An additional concern is that companies are spending money
6 to comply with the existing NIST HB section 3.40 tentative code yet are competing with a population of
7 existing equipment.
- 8 4. NIST OWM also would ask how many devices are out there that would be put into use and competing with
9 AC devices, thus creating a competitive advantage for DC devices?
- 10 5. There will be concerns about a dual tolerance structure since the proposal doesn't include a corresponding
11 marking or some other type of information requirement to alert consumers that purchasing electricity from
12 one fueling device does not provide the same accuracy assurance as it does from another fueling device.
13 Bottom line multiple tolerance tiers frustrate value comparisons

14 The NEWMA Specifications and Tolerances Committee recommends that this item remain in Developing Status.

CWMA Report: EVF-21.5	
Regional recommendation to NCWM on item status:	
<input type="checkbox"/>	Recommend as a Voting Item on the NCWM agenda
<input type="checkbox"/>	Recommend as an Information Item on the NCWM agenda
<input type="checkbox"/>	Recommend as an Assigned Item on the NCWM agenda <i>(To be developed by an NCWM Task Group or Subcommittee)</i>
<input checked="" type="checkbox"/>	Recommend as a Developing Item on the NCWM agenda <i>(To be developed by source of the proposal)</i>
<input type="checkbox"/>	Recommend Withdrawal of the Item from the NCWM agenda <i>(In the case of new proposals, do not forward this item to NCWM)</i>
<input type="checkbox"/>	No recommendation from the region to NCWM <i>(If this is a new proposal, it will not be forwarded to the national committee by this region)</i>
Comments and justification for the regional recommendation to NCWM: <i>(This will appear in NCWM reports)</i>	
Keith Bradley – Electrify America - Thanks to NIST for forming the work group. Industry has worked hard to determine compliance for existing devices. DC fast chargers already installed will have a larger retroactive tolerance. Recommended to remain as developing.	
Francesca Wahl – Tesla - Minor modifications outside of tolerances will still be needed in order for manufacturers to comply with changes to devices already in commercial use.	
Charlie Stutesman – KS – HB44 3.40 tentative code has been in place for 7 years. It needs to become active and enforceable.	
The CWMA S&T Committee recommends this item remain as a developing item per the request of the submitter.	

- 15
- 16 Additional letters, presentation and data may have been submitted for consideration with this item. Please refer to
17 <https://www.ncwm.com/publication-16> to review these documents.

1 **TXI – TAXIMETERS**

2 **TXI-22.1 V Table S.5. Categories of Device and Methods of Sealing**

3 **Source:**

4 NIST, Office of Weights and Measures

5 Amend Handbook 44, Taximeters Code as follows:

<i>Table S.5. Categories of Device and Methods of Sealing</i>	
<i>Categories of Device</i>	<i>Methods of Sealing</i>
<i>Category 1: No remote configuration capability.</i>	<i>Seal by physical seal or <u>two event counters: one for calibration parameters and one for configuration parameters.</u> for components that may be removed from the vehicle, a combination of physical seals and a physical or electronic link as described in S.5.2. Taximeters Calibrated to Specific Vehicles.</i>

6 *[Nonretroactive as of January 1, 2018]*
 7 **(Table Added 2017) (Amended 2022)**

8 **Previous Action:**

9 New

10 **Original Justification:**

11 Many of the current models of taximeters utilize compact, mobile-type devices (e.g., small compact electronic
 12 indicating elements, cellular telephones, computing tablets) that present a challenge based on their physical size to
 13 provide appropriate locations for provisions to attach a physical seal. For those devices, provision for applying a
 14 security seal can be accomplished through the use of electronic means (e.g., data change audit trail) however, that
 15 option is not currently included.

16 The current verbiage included in Table S.5. under “Methods of Sealing” for Category 1 devices includes reference to
 17 paragraph S.5.2. “Taximeters Calibrated to Specific Vehicles” which recognizes the use of an electronic link to prevent
 18 the intentional or inadvertent use of a taximeter in a vehicle that the taximeter was not connected to when the taximeter
 19 was calibrated. Taximeters using the mechanical components of the vehicle (e.g., rotation of wheels, transmission)
 20 for input in the calculation of distance measurement must maintain those parameter values such as the size and level
 21 of inflation of tires for the distance measurement to be accurate. A change of these values can render the calibration
 22 of the taximeter inaccurate. This is not a type of sealing that a regulatory official would typically replace if
 23 removed/broken and it is believed that the inclusion in this portion of the Taximeters Code was not appropriate. This
 24 type of electronic “paring” between the vehicle and the taximeter is sufficiently addressed in S.5.2. and therefore, the
 25 reference in Table S.5. is not needed.

26 The addition of this electronic means for sealing for taximeters will align the language in this code with fifteen other
 27 HB 44 specific device codes.

28 The submitter requested that this be a Voting Item in 2022.

29 **Comments in Favor:**

30 **Regulatory:**

- 31 • 2022 Interim: No Comments

- 1 **Industry:**
2 • 2022 Interim: No Comments

- 3 **Advisory:**
4 • 2022 Interim: A representative of NIST OWM commented on recognizing other means for sealing and
5 commented the addition of three parenthetical dates to clarify the enforcement date remains the same,
6 table's inclusion in the code, and the 2022 amendment to the table to recognize a Category 1 audit trail.
7 The commentor supports a voting status for this item.

8
9 **Comments Against:**

- 10
11 **Regulatory:**
12 • 2022 Interim: No Comments

- 13 **Industry:**
14 • 2022 Interim: No Comments

- 15 **Advisory:**
16 • 2022 Interim: No Comments

17 **Neutral Comments:**

- 18 **Regulatory:**
19 • 2022 Interim: No Comments

- 20 **Industry:**
21 • 2022 Interim: No Comments

- 22 **Advisory:**
23 2022 Interim: No Comments

24 **Item Development:**

25 NCWM 2022 Interim Meeting: The Committee agrees the item as having merit and will align this code with other
26 device codes. Based on no opposition and the submitters request for a vote, the committee has assigned a voting status
27 for this item at the 2022 Annual Meeting with the added three parenthetical dates: enforcement date, date of inclusion
28 in the code, and the 2022 amendment.

29 **Regional Associations' Comments:**

30 WWMA 2021 Annual Meeting: Tina Butcher (NIST OWM): They put this forward: the recommended changes are
31 just to clarify what is already in place for audit trails. This is to fill in the blanks for what is considered the minimum
32 for audit trails. This specifies two event counters for the minimum form of an audit trail.

33 The WWMA S&T Committee recommends that this item be assigned a Voting status. The Committee agrees that this
34 item has merit and is fully developed.

35 SWMA 2021 Annual Meeting: The committee heard no comments on this item. This committee recommends this
36 item move forward as a Voting item.

37 CWMA 2021 Interim Meeting: Tina Butcher-NIST recommends that this item move forward to voting. California
38 has this in type evaluation now.

39 CWMA S&T Committee recommends this item move forward as a voting item.

1 NEWMA 2021 Interim Meeting: Juana Williams NIST- commented in support and feels the item is fully developed
 2 and ready for voting status. Jim Willis (New York) and John McGuire (New Jersey) also supported moving this item
 3 forward with a voting status.
 4

5 The NEWMA Specifications and Tolerances Committee recommends that this item be given a Voting Status.

CWMA Report: TXI-22.1
<p>Regional recommendation to NCWM on item status:</p> <p><input checked="" type="checkbox"/> Recommend as a Voting Item on the NCWM agenda <input type="checkbox"/> Recommend as an Information Item on the NCWM agenda <input type="checkbox"/> Recommend as an Assigned Item on the NCWM agenda <i>(To be developed by an NCWM Task Group or Subcommittee)</i> <input type="checkbox"/> Recommend as a Developing Item on the NCWM agenda <i>(To be developed by source of the proposal)</i> <input type="checkbox"/> Recommend Withdrawal of the Item from the NCWM agenda <i>(In the case of new proposals, do not forward this item to NCWM)</i> <input type="checkbox"/> No recommendation from the region to NCWM <i>(If this is a new proposal, it will not be forwarded to the national committee by this region)</i></p>
<p>Comments and justification for the regional recommendation to NCWM: <i>(This will appear in NCWM reports)</i></p> <p>No comments from the floor.</p> <p>The CWMA S&T Committee recommends this moves forward as a voting item.</p>

6 Additional letters, presentation and data may have been submitted for consideration with this item. Please refer to
 7 <https://www.ncwm.com/publication-16> to review these documents.

8 **See Block 3 Items: Tolerances for Distance Testing.**

9 **GMA – GRAIN MOISTURE METERS 5.56 (A)**

10 **GMA-19.1 D Table T.2.1. Acceptance and Maintenance Tolerances Air Oven Method for**
 11 **All Grains and Oil Seeds.**

12 **Source:**
 13 NTEP Grain Analyzer Sector

14 **Purpose:**
 15 Reduce the tolerances for the air oven reference method.

16 **Item Under Consideration:**
 17 Amend Handbook 44, Grain Moisture Meter Code 5.56 (a) as follows:

18 **T.2.1. Air Oven Reference Method.** – Maintenance and acceptance tolerances shall be as shown in
 19 Table T.2.1. Acceptance and Maintenance Tolerances Air Oven Reference Method. Tolerances are expressed as
 20 a fraction of the percent moisture content of the official grain sample, together with a minimum tolerance.
 21 (Amended 2001)

Table T.2.1- Acceptance and Maintenance Tolerances Air Oven Reference Method		
Type of Grain, Class, or Seed	Tolerance	Minimum Tolerance
Corn, oats, rice, sorghum, sunflower	0.05 of the percent moisture content	0.8 % in moisture content
All other cereal grains and oil seeds	0.04 of the percent moisture content	0.7 % in moisture content

Table T.2.1. Acceptance and Maintenance Tolerances Air Oven Reference Method for All Grains and Oil Seeds	
<u>Tolerance</u>	<u>Minimum Tolerance</u>
<u>0.03 of the percent moisture content</u>	<u>0.5 % in moisture content</u>

(Amended 2001 **and 20XX**)

1 **Background/Discussion:**

2 This item has been assigned to the submitter for further development. For more information or to provide comment,
3 please contact:

4 Mr. Karl Cunningham
5 Illinois Department of Agriculture
6 217-785-8301, karl.cunningham@illinois.gov

7 Samples and list of grains that AMS, FGIS request from states to include in their ongoing calibration program. States
8 and other interested parties wanted to verify that corn samples from their state were included in the calibration data
9 for NTEP meters because of variations states reported between UGMA meter and other meter technologies on corn
10 samples.

11 During the 2016 Grain Analyzer Sector Meeting, numerous instances of inconsistent moisture meter measurements
12 involving grain shipments from U.S. interior facilities to U.S. export port facilities were reported. The Sector received
13 a suggestion that if the UGMA can make better measurements, then the Sector should consider reducing the applicable
14 tolerances in HB 44. At the 2016 and 2017 Grain Analyzer Sector meetings Mr. Charlie Hurburgh (Iowa State
15 University) agreed to chair a GA Sector Task Group to review the current HB 44 tolerance with both UGMA meters
16 and Non-UGMA meters. During the 2018 meeting Mr. Hurburgh reported that based on data he analyzed from Iowa
17 State Weights and Measures Grain Inspection reports, UGMA meters read closer to the reference air oven moisture
18 results than non-UGMA meters.

19 It was also noted during the 2018 NTEP Grain Analyzer Sector meeting that the current tolerances were developed in
20 1991 and have not been changed to coincide with the change in technology for these devices; and this action is needed
21 for grain industry risk management.

22 Prior to the 2019 NCWM Interim Meeting, all four regional weights and measures associations agreed to forward the
23 proposal as a voting item on the Interim Agenda. However, following the regional meetings, additional data was
24 submitted to the Sector which indicates a need to consider developing different tolerance for some grain types.
25 Through a subsequent ballot, and a majority vote, the Sector agreed to recommend changing the status of the item to
26 developing to provide the Sector time to consider additional data and changes to its original proposal.

1 NCWM 2019 Interim Meeting: The NCWM S&T Committee heard comments to agenda item GMA-3. Mr. Loren
 2 Minnich (KS) commented that he spoke with Ms. Diane Lee (NIST OWM) and she reported that one state was
 3 concerned with the application of the reduced tolerances to all grain types, specifically grains with hulls or husks. Mr.
 4 Minnich suggested that this item be assigned a “Developing” status to allow for more research into this issue. The
 5 committee also received written comments from NIST, OWM (see NIST, OWM Analysis posted on the NCWM
 6 Website). During the 2019 Interim Meeting, the S&T Committee considered the comments during the opening
 7 hearing and comments submitted prior to the meeting and assigned a “Developing” status for this item.

8 NCWM 2019 Annual Meeting: Ms. Diane Lee (NIST OWM) provided an update on the history of the item. Ms. Lee
 9 noted that the NTEP Grain Analyzer Sector will review data from Arkansas at its 2019 meeting intended to assure that
 10 proposed changes to the tolerances can be applied to all grains. Ms. Lee speaking on behalf of the Sector stated that
 11 the Developing status assigned to this item is appropriate.

12 NCWM 2020 Interim Meeting: The Committee heard from Ms. Diane Lee (NIST OWM) who stated that when this
 13 item was initially submitted the GMM Sector agreed to reduce tolerance based on data that was limited to corn and
 14 soybeans. Following the review of the initial data, additional data from Long Grain Rough Rice was reviewed and
 15 the sector agreed that additional data was needed on other grains to include oats, rice, and barley, prior to changing
 16 the tolerances. Ms. Lee requested that the item remain developing status as additional data is collected.

17 During the Committee’s work session, the committee agreed to retain this item as Developing to allow the submitter
 18 to continue working with members of the grain analyzer sector to collect additional data.

19 NCWM 2020 Annual Meeting: Due to the 2020 Covid-19 pandemic, this meeting was adjourned to January 2021, at
 20 which time it was held as a virtual meeting. Due to constraint of time, only those items designated as 2020 Voting
 21 Items were addressed. All other items were addressed in the subsequent 2021 NCWM Interim Meeting.

22 NCWM 2021 Annual Meeting: The Committee heard comments from Ms. Diane Lee (NIST OWM) who noted that
 23 additional data is needed to assess the proposed tolerances. Ms. Lee requested that this item remain Developing.
 24 During the Committee’s work session, the Committee agreed to a Developing status for this item.

25 NCWM 2022 Interim Meeting: The Committee heard comments from Ms. Diane Lee (NIST OWM) who noted that
 26 additional data is needed to assess the proposed tolerances. Ms. Lee added that states would be submitting more data.
 27 Ms. Lee requested that this item remain Developing. During the Committee’s work session, the Committee agreed to
 28 a Developing status for this item.

29 **Regional Associations’ Comments:**

30 WWMA 2021 Annual Meeting: Diane Lee (NIST OWM): This item has been on the agenda since 2019 - when it was
 31 proposed there was a study done on only corn and soybean samples (maybe we could lower the tolerances) subsequent
 32 to that, they received a report from a state to hold off to look at more data from different grain types (rough rice).
 33 Agreed to collect additional data, from a few additional states. A memo has gone out to participating states to collect
 34 more data on additional grains. They are in the process of collecting and hope to have a report in the interim on
 35 validity. Support as a developing item.

36 The WWMA S&T Committee recommends the status remain developmental.

37 SWMA 2021 Annual Meeting: The committee heard no comments on this item. This committee recommends this
 38 item remain Developing so that more data can be collected and presented in the future.

39 CWMA 2021 Interim Meeting: Diane Lee-NIST is part of the sector. The sector met in August of this year and four
 40 States will be submitting data. Once data is collected, it will be given to the Grain Sector for them to decide what to
 41 with the item. Doug Musick-Kansas are there old technology that can meet this requirement? Has any data been
 42 submitted regarding this?
 43

44 CWMA S&T Committee recommends this item as developing.

1 NEWMA 2021 Interim Meeting: No comments were heard. The NEWMA Specifications and Tolerances Committee
2 recommends that this item remain in Developing Status.

CWMA Report: GMA-19.1	
Regional recommendation to NCWM on item status:	
<input checked="" type="checkbox"/> Recommend as a Voting Item on the NCWM agenda <input type="checkbox"/> Recommend as an Information Item on the NCWM agenda <input type="checkbox"/> Recommend as an Assigned Item on the NCWM agenda <i>(To be developed by an NCWM Task Group or Subcommittee)</i> <input type="checkbox"/> Recommend as a Developing Item on the NCWM agenda <i>(To be developed by source of the proposal)</i> <input type="checkbox"/> Recommend Withdrawal of the Item from the NCWM agenda <i>(In the case of new proposals, do not forward this item to NCWM)</i> <input type="checkbox"/> No recommendation from the region to NCWM <i>(If this is a new proposal, it will not be forwarded to the national committee by this region)</i>	
Comments and justification for the regional recommendation to NCWM: (This will appear in NCWM reports)	
Doug Musick – KS - Some feel that rice won't be able to meet the tighter tolerance. Supports moving to voting. No data has been submitted regarding the concern, so they can do this at a later date if desired. The CWMA S&T Committee recommends this moves forward as a voting item.	

3
4 Additional letters, presentation and data may have been submitted for consideration with this item. Please refer to
5 <https://www.ncwm.com/publication-16> to review these documents.

6 **MDM – MULTIPLE DIMENSION MEASURING DEVICES**

7 **MDM-22.1 D S.1.7. Minimum Measurement.**

8 **Source:**
9 Parceltool P/L

10 **Purpose:**
11 Exempt mobile tape based MDMD devices from the 12D minimum measurement.

12 **Item Under Consideration:**
13 Amend Handbook 44, Multiple Dimension Measuring Devices Code as follows:

14 **S.1.7. Minimum Measurement.** – Except for entries of tare **and mobile tape based MDMD devices**, the
15 minimum measurement by a device is 12 d. The manufacturer may specify a longer minimum measurement. For
16 multi-interval devices, this applies only to the first measuring range (or segment) of each measurement axis
17 (length, width, and height).
18 (Amended 2017 **and 20XX**)

19 **Previous Action:**
20 New

21 **Original Justification:**
22 The 12 d minimum measurement is designed for instruments that use an internal rounding function to round the actual
23 measurement up or down to the nearest value of d before being displayed. For measurement of 12 d, or less, the

1 potential error in the measurement is considered too large and therefore the specification of the 12 d minimum
2 measurement is in place.

3 Measurements below 12 d are commonplace when using a mobile tape (tape measure) type of device for determining
4 measurements. An accepted practice for this type of device is for the Measurement to be rounded up to the nearest
5 whole unit of measurement (e.g., 1 inch) before being used to calculate any charges.

6 The submitter requested that this be a Voting Item in 2022.

7 **Comments in Favor:**

8 **Regulatory:**

- 9 •

10 **Industry:**

- 11 •

12 **Advisory:**

- 13 •

14 **Comments Against:**

15 **Regulatory:**

- 16 •

17 **Industry:**

- 18 • Russ Vires (SMA); SMA opposes the item.

19 **Advisory:**

- 20 •

21 **Neutral Comments:**

22 **Regulatory:**

- 23 • Matt Douglas (California Division of Measurement Standards) suggested that the submitter submit
24 data and work with the MDMD sector to develop the item.

25 **Industry:**

- 26 •

27 **Advisory:**

- 28 • Darrel Flocken (NCWM, NTEP); Explained the device they are seeking this change for is a tape
29 measure and they may have misunderstood what they are asking for.
30 • This was first proposed in 2019 and was withdrawn. There appears to be no new justification.

31 **Item Development:**

32 NCWM 2022 Interim Meeting: During the committee work session, the committee determined that more input was
33 needed from the submitter. This item has been assigned to the submitter for further development. For more
34 information or to provide comment, please contact:

35 Tony Bauer
36 Parceltool P/L
37 +61 439-89-2468, tbauer@cubical.com

1 **Regional Associations' Comments:**

2 WWMA 2021 Annual Meeting: Russell Vires (Mettler Toledo): Mettler is opposed to the change proposed here. No
 3 reason to eliminate the minimum measurement.

4 The WWMA S&T Committee recommends that this item be assigned a Developmental status. The Committee
 5 recommends that the submitter provide data to support why the devices are unable to meet the 12-division requirement.
 6 The Committee also recommends that the submitter consult the MDMD working group.

7 SWMA 2021 Annual Meeting: Russ Vires, Mettler Toledo, requested that this item be withdrawn because the
 8 justification was invalid.

9 This committee recommends this item be Withdrawn due to having no justification provided for the change.

10 CWMA 2021 Interim Meeting: No comments from the floor. CWMA S&T Committee has no recommendation for
 11 this item.

12 NEWMA 2021 Interim Meeting: Rick Harshman (NIST OWM) commented This is a new item and members of NIST
 13 OWM's LMDP have not had opportunity to review/consider it. There's little information provided in the
 14 background/discussion of this item. If the device has digital indication, by rounding all values up as is specified in
 15 the background/discussion, the device would fail to comply with HB 44 paragraph G-S.5.2.2.(c). Lou Sakin
 16 (Hopkinton/Northbridge, MA) commented that this item is in-need of further development.

17 The NEWMA Specifications and Tolerances Committee recommends that this item be given Developing Status.

CWMA Report: MDM-22.1	
Regional recommendation to NCWM on item status:	
<input type="checkbox"/> Recommend as a Voting Item on the NCWM agenda <input type="checkbox"/> Recommend as an Information Item on the NCWM agenda <input type="checkbox"/> Recommend as an Assigned Item on the NCWM agenda <i>(To be developed by an NCWM Task Group or Subcommittee)</i> <input type="checkbox"/> Recommend as a Developing Item on the NCWM agenda <i>(To be developed by source of the proposal)</i> <input checked="" type="checkbox"/> Recommend Withdrawal of the Item from the NCWM agenda <i>(In the case of new proposals, do not forward this item to NCWM)</i> <input type="checkbox"/> No recommendation from the region to NCWM <i>(If this is a new proposal, it will not be forwarded to the national committee by this region)</i>	
Comments and justification for the regional recommendation to NCWM: (This will appear in NCWM reports)	
Russ Vires – SMA - The SMA opposes this item. The justification provided by the submitter does not adequately identify the issue this item is attempting to resolve, and why mobile tape-based MDMD devices should be exempted compared to all other MDMD devices. The SMA recommends that the submitter work with the MDMD Workgroup to develop a suitable solution to this issue. The CWMA S&T Committee recommends this item to be withdrawn.	

18 Additional letters, presentation and data may have been submitted for consideration with this item. Please refer to
 19 <https://www.ncwm.com/publication-16> to review these documents.

20 **OTH – OTHER ITEMS**

21 **OTH-16.1 D Electric Watthour Meters Code under Development**

22 **Source:**
 23 NIST, Office of Weights and Measures

Purpose:

- 1) Make the weights and measures community aware of work being done within the NIST U.S. National Work Group (USNWG) on Electric Vehicle Fueling and Submetering to develop proposed requirements for electric watt-hour meters used in submeter applications in residences and businesses;
- 2) Encourage participation in this work by interested regulatory officials, manufacturers, and users of electric submeters.
- 3) Allow an opportunity for the USNWG to provide regular updates to the S&T Committee and the weights and measures community on the progress of this work;
- 4) Allow the USNWG to vet specific proposals as input is needed.

Item Under Consideration:

This item was added to the NCWM S&T Committee’s agenda as a “Developing Item” to allow a forum in which progress of the USNWG can be reported as it develops legal metrology requirements for electric watt-hour meters and continues work to develop test procedures and test equipment standards.

Ms. Tina Butcher (NIST OWM), Chair of the USNWG on Electric Refueling & Submetering has continued to provide regular updates to the Committee on this work and to encourage input and participation from the weights and measures community since the addition of this item to the Committee’s agenda in 2016. See the Committee’s 2016 through 2021 Final Reports for details.

The SG is nearing completion of a draft NIST Handbook code for “Non-Utility Electricity-Measuring Systems.” Work continues on a few sections of the draft code; however, the SG would like to begin getting feedback from the weights and measures community on the draft code.

The draft code is available for download at <https://www.ncwm.com/publication-15>.

The Subgroup asks the NCWM S&T Committee to consider (and the regional associations to support) the following.

1. Permitting the item to remain in a Developing status on its agenda to allow for further development and input on the draft Handbook 44 Code.
2. Permitting the SG to post the draft code along with other supporting documents on the NCWM S&T Committee’s web page. Areas under review and development by the SG will be noted in highlighted text.
3. Encouraging weights and measures officials and industry to study the draft code and provide input to the SG, including proposed changes along with rationale for such changes and any indication of support or opposition.

The SG requests comments be submitted to the SG Chair or Technical Advisor by the end of March 2022. The SG will review and address comments, updating the draft code as needed and requesting the NCWM S&T Committee to post updated versions for review as available. The SG will finalize a draft for submission in the 2022-2023 NCWM cycle.

The above approach will allow the SG the opportunity to solicit input and incorporate comments from the weights and measures community on the draft code in advance of proposing it for a vote more broadly.

The Electric Watt-hour Meter Subgroup (EWH SG) of the USNWG on Electric Vehicle Fueling & Submetering has held multiple in-person and web meetings since the 2017 NCWM Annual Meeting. This SG has held 15 virtual meetings since January 2021 focused on finalizing a draft code on “Non-Utility Electricity-Measuring Systems.”

Those interested in participating in this work are asked to contact SG Chair, Ms. Lisa Warfield, or Technical Advisor, Ms. Tina Butcher. Contact information is included in the “Background” section of this item.

1 **Background/Discussion:**

2 This item has been assigned to the submitter for further development. For more information or to provide comment,
3 please contact:

Electric Vehicle Refueling Subgroup:

Ms. Tina Butcher, Chair
NIST Office of Weights and Measures
301-975-2196, tbutcher@nist.gov
Or
Ms. Juana Williams, Technical Advisor
NIST Office of Weights and Measures
301-975-2196, juana.williams@nist.gov

Electric Watthour Meters Subgroup:

Ms. Lisa Warfield, Chair
NIST Office of Weights and Measures
301-975-3308, lisa.warfield@nist.gov
Or
Ms. Tina Butcher, Technical Advisor
NIST Office of Weights and Measures
301-975-2196, tbutcher@nist.gov

4 This item was submitted as a Developing item to provide a venue to allow the USNWG to update the weights and
5 measures community on continued work to develop test procedures and test equipment standards within its Electric
6 Vehicle Refueling Subgroup. This item will also serve as a forum in which to report work on the development of a
7 proposed tentative code for electric watthour meters in residential and business locations by the USNWG's Electric
8 Watthour Meters Subgroup and a placeholder for its eventual submission for consideration by NCWM.

9 Ms. Tina Butcher (NIST OWM), Chairman of the USNWG on Electric Refueling & Submetering has continued to
10 provide regular updates to the Committee on this work. See the Committee's 2016 through 2018 Final Reports for
11 details.

12 NCWM 2018 Interim Meeting: No comments were heard on this item and the Committee agreed to maintain its
13 "Developing" status. The Committee did not take comments during open hearings on Developing items at the 2018
14 NCWM Annual Meeting and agreed to allow only the submitter of a Developing item (or block of Developing items)
15 to provide an update on the progress made to further develop the item(s) since the 2018 NCWM Interim Meeting. The
16 Committee received an update on this item from Ms. Tina Butcher (NIST OWM), Chair of the USNWG on Electric
17 Refueling & Submetering. See the Committee's 2018 Final Report for Details.

18 OWM personnel were unable to attend the 2019 NCWM Interim Meeting due to the Federal Government shutdown
19 in early 2019 due to a lack of appropriations; however, OWM provided written comments to the Committee on this
20 item in the advance of the meeting, including the following update on this item:

- 21 • The Electric Watthour Meter Subgroup (EWH SG) of the USNWG on Electric Vehicle Fueling & Submetering
22 has held multiple in-person and web meetings since the 2017 NCWM Annual Meeting.
- 23 • The SG met in September 2017, November 2017, May 2018, and August 2018. All meetings included web-
24 conferencing to allow those not able to attend in person to participate.
- 25 • The SG developed a proposed addition to NIST Handbook 130's Uniform Regulation for the Method of Sale
26 (MOS) of Commodities (see Item MOS-8 on the L&R Committee's Agenda) to specify a method of sale for
27 electrical energy sold through these systems and submitted the proposal to the four regional weights and measures
28 association meetings in Fall 2018.
 - 29 ○ Three of the four regions recommend the MOS proposal on the L&R Agenda as a voting item, with the
30 fourth abstaining due to lack of experience with these systems within the region.
- 31 • The SG continues work on a proposed code for EWH-type meters for NIST Handbook 44 and expects to have a
32 draft ready for the 2020 NCWM cycle.
- 33 • OWM requests this item be maintained on the S&T Committee's agenda as a Developing Item while the SG
34 finalizes its proposed HB 44 draft. OWM will continue to apprise the Committee of progress.
- 35 • At their Fall 2018 meetings, all four regional associations indicated support for maintaining this as a Developing
36 item on the Committee's agenda.

1 • The SG will hold its next in-person meeting in February 2019 in Sacramento, CA. (*Technical Advisor's Note:*
2 *This meeting was rescheduled to April 2019.*)

3 • Those interested in participating in this work are asked to contact SG Chair, Ms. Lisa Warfield, or Technical
4 Advisor, Ms. Tina Butcher.

5 NCWM 2019 Interim Meeting: The Committee heard no comments on this item. At its work session, Committee
6 members agreed with the submitter and the Regional Associations that this item should be assigned a Developing
7 status.

8 NCWM 2019 Annual Meeting: Ms. Tina Butcher (NIST OWM) provided the Committee with an update on the further
9 development of this item. Ms. Butcher reported that the EWH SG will meet next in August 2019 to continue its work
10 and requested this item remain on the S&T Committee agenda as a Developing item. During the committee's work
11 session, the Committee agreed with the submitter to retain this item in a Developing status.

12 NCWM 2020 Interim Meeting: The Committee heard from Ms. Butcher who provided an update on developments in
13 the Electric Watthour Meters Code which is also included in the NIST OWM analysis. Ms. Butcher requested that
14 this item be given a developing status.

15 During the Committee work session, the committee agreed that this item should be given a Developing status.

16 NCWM 2020 Annual Meeting: Due to the 2020 Covid-19 pandemic, this meeting was adjourned to January 2021, at
17 which time it was held as a virtual meeting. Due to constraint of time, only those items designated as 2020 Voting
18 Items were addressed. All other items were addressed in the subsequent 2021 NCWM Interim Meeting.

19 NCWM 2021 Interim Meeting: The Committee heard from Ms. Tina Butcher who provided an update on the
20 developments in the Electric Watthour Code which is include in the NIST OWM analysis and Ms. Butcher requested
21 that this item be given a developing status. The Committee agreed that the item be given a Developing status.

22 NCWM 2021 Annual Meeting: Ms. Tina Butcher (NIST OWM) provided an update on the developments in the
23 Electric Watthour Code which is included in the NIST OWM analysis. Ms. Butcher noted that the Electric Watthour
24 Code is in Development and anticipates a Code by Fall 2021. There was discussion on definitions for electric master
25 meters and possibly separating the definitions for gas and water master meters and Ms. Butcher requested that this
26 item be given a developing status. The Committee agreed that the item be given a Developing status.

27 NCWM 2022 Interim Meeting: Matt Douglas (California – DMS) stated that California supports the development of
28 this item but has concerns about identity marking requirements being on a separate document. Also that the devices
29 should be easy to test before and after instillation. This device should allow for electronic data logger. Juana Williams
30 (NIST) commented that the subgroup had provided a draft code that is on the website. Ms. Williams requested
31 comments be submitted to Tina Butcher (NIST) or Lisa Warfield (NIST) by March 22, 2022. Ms. Williams stated
32 these comments will be used to provide and updated draft for the 2022-2023 submission cycle and the item remain in
33 developing status. The Committee agreed that the item be given a Developing status.

34 **Regional Associations' Comments:**

35 WWMA 2021 Annual Meeting: Matt Douglas (California - DMS): California supports further development of this
36 item. Concerns about the identity marking information which allows a separate document to satisfy model and seral
37 number prefixes and doesn't clarify what constitutes a separate document other than hard or electronic and does not
38 originate from the system. We strongly feel that testing capabilities should be easily and readily achievable before and
39 after the installation as well as means for verifying validity of complaints based on inaccuracy. An observation – as
40 written the method of sealing category II and III requires a hard copy of audit trail and event logger information. Other
41 codes are being considered to allow electronic forms of this information.

42 The WWMA S&T Committee recommends this item remain in a Developing status. The Committee acknowledged
43 that, as referenced in the Committee's agenda, the submitter of the item has asked the item to remain in a Developing
44 status to allow for further refinement and input on the draft NIST HB 44 code. Based upon this information and the

CWMA S&T 2022 Annual Meeting Report

1 comments received during its open hearings, the Committee encourages the NIST USNWG Subgroup to consider the
2 comments provided by CA DMS at the WWMA meeting. The Committee also encourages others in the weights and
3 measures community to continue studying the draft code and provide input to the Subgroup as requested in the agenda
4 item.

5 SWMA 2021 Annual Meeting: The committee heard no comments on this item. This committee recommends this
6 item remain Developing so that more work can continue at the request of the submitter.

7 CWMA 2021 Interim Meeting: Tina Butcher-NIST item has been on the agenda for 5 years. Needs a little more work
8 from subcommittee. She recommended item as developing and would like public comments.

9
10 CWMA S&T Committee recommends the item as a developing item.

11 NEWMA 2021 Interim Meeting: Juana Williams (NIST OWM) commented below and recommended developing
12 status.

- 13 • NIST OWM notes that the USNWG Subgroup on Watthour-Type Electric (EWH) Meters is nearing completion
14 of its proposed tentative code for utility-type watthour submeters
- 15 • As noted in the agenda, there are a few sections of the draft code that require additional work by the EWH
16 Subgroup.
 - 17 ○ NIST OWM asks that the item remain in a Developing status while the Subgroup completes these
18 remaining items.
- 19 • The Subgroup is asking for feedback on the remaining portions of the draft code thus far.
 - 20 ○ The NCWM S&T Committee has agreed to post the draft on the S&T’s website to allow for broader
21 review and comment.
 - 22 ○ NIST OWM encourages review and input on the draft.
 - 23 ○ This input will allow the Subgroup to begin incorporating feedback from the community and better
24 prepare the draft for submission in the 2022-2023 cycle.

25 The NEWMA Specifications and Tolerances Committee recommends that this item be given Developing Status.

CWMA Report: OTH-16.1
Regional recommendation to NCWM on item status: <ul style="list-style-type: none"><input type="checkbox"/> Recommend as a Voting Item on the NCWM agenda<input type="checkbox"/> Recommend as an Information Item on the NCWM agenda<input type="checkbox"/> Recommend as an Assigned Item on the NCWM agenda <i>(To be developed by an NCWM Task Group or Subcommittee)</i><input checked="" type="checkbox"/> Recommend as a Developing Item on the NCWM agenda <i>(To be developed by source of the proposal)</i><input type="checkbox"/> Recommend Withdrawal of the Item from the NCWM agenda <i>(In the case of new proposals, do not forward this item to NCWM)</i><input type="checkbox"/> No recommendation from the region to NCWM <i>(If this is a new proposal, it will not be forwarded to the national committee by this region)</i>
Comments and justification for the regional recommendation to NCWM: <i>(This will appear in NCWM reports)</i> <p>Lisa Warfield – NIST – An extensive group of industry and regulators are working to understand each others’ roles as this code develops. The NIST work group is quite active and making progress.</p> <p>The CWMA S&T Committee recommends this item to remain as developing.</p>

26 Additional letters, presentation and data may have been submitted for consideration with this item. Please refer to
27 <https://www.ncwm.com/publication-16> to review these documents.

1 **OTH-22.1 D Appendix A: Fundamental Considerations, 3. Testing Apparatus**

2 This item was modified and combined with Item GEN-19.1 and resides in Block 8.

3 **OTH-22.2 V Appendix D – Definitions: face**

4 **Source:**

5 NIST, Office of Weights and Measures

6 **Purpose:**

7 To correct the apparent oversight of *not* referencing the codes that clearly make use of the term “face”; include the
 8 missing code section numerical designations of 3.32, 3.37, and 3.39 in the [brackets] following the second meaning
 9 definition of the term “face” in NIST Handbook 44 Appendix D. The inclusion of those specific device code
 10 designations will clarify the term is applicable to retail devices addressed in the LPG and Anhydrous Ammonia Liquid-
 11 Measuring Devices, Mass Flow Meters (MFM), and Hydrogen Gas-Measuring Devices Codes, respectively. The term
 12 has special meaning for these types of systems because the “face” of these retail devices is specified as the only
 13 permissible location for specific quantity, pricing, and related marking information that provide clarity about the
 14 correct computation of each sale by the dispensing system.

15 **Item Under Consideration:**

16 Amend Handbook 44, Appendix D – Definitions as follows:

17 **face.** – That portion of a computing-type pump or dispenser which displays the actual computation of price
 18 per unit, delivered quantity, and total sale price. In the case of some electronic displays, this may not be an
 19 integral part of the pump or dispenser. [3.30, **3.32, 3.37, and 3.39**]
 20 (Added 1987) (**Amended 2022**)

21 **Previous Action:**

22 New

23 **Original Justification:**

24 Multiple permanent measuring device code sections in NIST Handbook (HB) 44 specify that either the initial zero
 25 condition, the display of the unit price, or other marking information shall be posted or displayed on either the face or
 26 each “face” of the dispenser. Currently only the Liquid-Measuring Devices code’s numerical designation (i.e., 3.30)
 27 is referenced in the NIST HB 44 Appendix D definition of the term “face.” The term also has special meaning for
 28 three other types of measuring devices/systems (i.e., LPG, MFM [e.g., CNG and LNG], and gaseous hydrogen) yet
 29 those code’s numerical designations are not shown in the [brackets] following the definition.

30 This proposal is a housekeeping item intended to correct the omission of multiple numerical designations of applicable
 31 code sections from the definition of the term “face.” Those codes’ numerical designations should have appeared in
 32 the definition at the same time as the term “face” was first recognized in each codes’ display and posting requirements.
 33 Correcting this oversight can be accomplished by including in this distinct term references to all applicable handbook
 34 codes sections. The proposed modification of the definition provides the missing reference to a special term that
 35 clarifies the intended placement of essential transaction information on the device. This has benefits for the equipment
 36 manufacturer designing the device, but also ensures clear and easy access and use of the information by both the buyer
 37 and seller.

38 The wording of the current definition may seem a bit archaic; on the other hand, its scope remains broad enough to
 39 recognize both customary transaction information as well as the more recent use of nontraditional application-specific
 40 computational information such as supplemental fuel conversion units or instances where there is the option for use
 41 of either a built-in or remote primary display.

42 The 15 relevant handbook code paragraphs that include requirements for specific information to be either indicated,
 43 displayed, posted, or automatically shown on the “face” of device types other than retail liquid measuring devices

1 (i.e., code section 3.30) are listed below. Since the definition of “face” is applicable to these specific device types a
2 modification of the handbook definition of the term “face” is warranted to include three additional device-specific
3 code designations in the definition. Those 15 paragraphs are provided in their entirety in an *attachment* to this
4 proposal (the text was excerpted from the 2020 edition of NIST Handbook 44). This detailed information was
5 provided to assist the community in its review and consideration of the proposal for expanding the codes referenced
6 in the definition of “face” from one to four sections. The applicable code paragraphs with requirements for either
7 displaying or posting the initial zero condition, display of the unit price and quantity, and/or other marking information
8 on the “face” of the retail device/dispenser are:

- 9 3.32 LPG and Anhydrous Ammonia Liquid-Measuring Devices Code paragraphs:
 - 10 S.1.4.1. Indication of Delivery; For Retail Devices Only
 - 11 S.1.5.1. Display of Unit Price and Product Identity
 - 12 UR.2.7.1. Unit Price and Product Identity
- 13 3.37. Mass Flow Meters Code paragraphs:
 - 14 S.2.5.1. Unit Price
 - 15 S.2.6.2. Display of Quantity and Total Price
 - 16 S.2.8. Indication of Delivery
 - 17 S.5.2. Marking of Equivalent Conversion Factors for Compressed Natural Gas
 - 18 S.5.3. Marking of Equivalent Conversion Factor for Liquefied Natural Gas
 - 19 UR.3.1. Unit Price and Product Identity for Retail Dispensers.
 - 20 UR.3.1.1. Marking of Equivalent Conversion Factors for Compressed Natural Gas
 - 21 U.R.3.1.2. Marking of Equivalent Conversion Factor for Liquefied Natural Gas
- 22 3.39 Hydrogen Gas-Measuring Devices Code paragraphs:
 - 23 S.2.4.1. Unit Price
 - 24 S.2.5.2. Display of Quantity and Total Price
 - 25 S.2.7. Indication of Delivery
 - 26 UR.3.1. Unit Price and Product Identity for Retail Dispensers

27 The submitter requested that this be a Voting Item in 2022.

28 **Comments in Favor:**

29 **Regulatory:**

- 30 •

31 **Industry:**

- 32 •

33 **Advisory:**

- 34 • Juana Williams (NIST) explained that this is essentially a housekeeping item to correct the definition
35 of “face” to add code numbers 3.32, 3.37, 3.39.

36 **Comments Against:**

37 **Regulatory:**

- 38 •

39 **Industry:**

- 40 •

1 **Advisory:**

- 2 •

3 **Neutral Comments:**

4 **Regulatory:**

- 5 •

6 **Industry:**

- 7 •

8 **Advisory:**

- 9 •

10 **Item Development:**

11 NCWM 2022 Interim Meeting: Based on no comments in opposition and the submitters request for a voting status,
12 the committee recommends that this item be voted on at the annual meeting.

13 **Regional Associations' Comments:**

14 WWMA 2021 Annual Meeting: Matt Douglas (California - DMS): This item seems to be housekeeping. CA DMS
15 supports this code.

16 The WWMA S&T Committee recommends that this item be assigned a Voting status. The Committee agrees that this
17 item has merit and is fully developed.

18 SWMA 2021 Annual Meeting: The committee heard no comments on this item. This committee recommends moving
19 this forward as a Voting item.

20 CWMA 2021 Interim Meeting: Tina Butcher-NIST item is cleaned up and ready to move forward as a voting item.

21
22 CWMA S&T Committee recommends this item move forward as a voting item.

23 NEWMA 2021 Interim Meeting: Juana Williams (NIST OWM) commented that this is a house keeping item and
24 recommends moving forward as a voting item. Jim Willis (New York) also supports giving this item voting status.

25 The NEWMA Specifications and Tolerances Committee recommends that this item be moved forward with a Voting
26 Status.

CWMA Report: OTH-22.2	
Regional recommendation to NCWM on item status:	
<input checked="" type="checkbox"/>	Recommend as a Voting Item on the NCWM agenda
<input type="checkbox"/>	Recommend as an Information Item on the NCWM agenda
<input type="checkbox"/>	Recommend as an Assigned Item on the NCWM agenda <i>(To be developed by an NCWM Task Group or Subcommittee)</i>
<input type="checkbox"/>	Recommend as a Developing Item on the NCWM agenda <i>(To be developed by source of the proposal)</i>
<input type="checkbox"/>	Recommend Withdrawal of the Item from the NCWM agenda <i>(In the case of new proposals, do not forward this item to NCWM)</i>
<input type="checkbox"/>	No recommendation from the region to NCWM <i>(If this is a new proposal, it will not be forwarded to the national committee by this region)</i>
Comments and justification for the regional recommendation to NCWM: <i>(This will appear in NCWM reports)</i>	
No comment from the floor.	

The CWMA S&T Committee recommends this moves forward as a voting item.

1 Additional letters, presentation and data may have been submitted for consideration with this item. Please refer to
2 <https://www.ncwm.com/publication-16> to review these documents.

3 **ITEM BLOCK 1 (B1) TERMINOLOGY FOR TESTING STANDARDS**

4 *NOTE: During the 2019 NCWM Interim Meeting, the S&T Committee considered comments during Opening Hearings*
5 *and recommended that the following Items appearing on the 2019 Agenda as GEN-3, B1, B2, LPG-3 and MFM-5 be*
6 *combined and gave these items an Assigned status. Item Block 1 included previously numbered items: GEN-3; Block*
7 *1; Block 2; LPG-3; and MFM-5.*

8 *NOTE: Based on comment heard during the 2021 Annual Meeting, the S&T Committee recommended that all items*
9 *that were combined with Block 1 “Terminology For Testing Standards” and originally appeared as a separate item*
10 *or separate block of items on the S&T agenda prior to 2019, be removed from Block 1 and appear as originally*
11 *presented. As such, the items presented in this block are the original items included in Block 1 “Terminology For*
12 *Testing Standards”.*

14 **Source:**

15 NIST, Office of Weights and Measures

16 **Purpose:**

17 To remove the current limited definition and use of the term “Transfer Standard” and eliminate terms “Testing
18 Standards”, “Verification (Testing) Standards”, and instead use the term Field Standard, consistent with its reference
19 in Handbook 44, Appendix A, Fundamental Considerations and its use in several sections of Handbook 44. To correct
20 the broad use of the term Transfer Standard and instead replace its use with the term Field Standard. To update all
21 use of the term “standard” to use the term “Field Standard”. To remove the current limited definition of Transfer
22 Standard and instead use the term Field Standard.

23 **B1: SCL-18.1 W N.2. Verification (Testing) Standards**

24 **Item Under Consideration:**

25 Amend Handbook 44, Scales Code as follows:

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

30 (Amended 1986 and 20XX)

31 **B1: ABW-18.1 W N.2. Verification (Testing) Standards**

32 **Item Under Consideration:**

33 Amend Handbook 44, Automatic Bulk Weighing Systems Code as follows:

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

37 (Amended 20XX)

1 **B1: AWS-18.1 W N.1.3. Verification (Testing) Standards, N.3.1. Official Tests, UR.4. Testing**
 2 **Standards**

3 **Item Under Consideration:**

4 Amend Handbook 44, Automatic Weighing Systems Code as follows:

5 **N.1.3. Verification (Testing) Field Standards.** – Field standard weights shall comply with requirements of NIST
 6 Handbook 105-1, “Specifications and Tolerances for Field Standard Weights (Class F)” or the tolerances
 7 expressed in Fundamental Considerations, paragraph 3.2. (i.e., one-third of the smallest tolerance applied).
 8 **(Amended 20XX)**

9 **N.3.1. Official Tests.** – Officials are encouraged to periodically witness the required “in house” verification of
 10 accuracy. Officials may also conduct official tests using the on-site **testing-field** standards or other appropriate
 11 standards belonging to the jurisdiction with statutory authority over the device or system.
 12 **(Amended 20XX)**

13 **UR.4. Testing-Field Standards.** – The user of a commercial device shall make available to the official with
 14 statutory authority over the device **testing-field** standards that meet the tolerance expressed in Fundamental
 15 Considerations, paragraph 3.2. Tolerances for Standards (i.e., one-third of the smallest tolerance applied). The
 16 accuracy of the **testing-field** standards shall be verified annually or on a frequency as required by the official with
 17 statutory authority and shall be traceable to the appropriate SI standard.
 18 **(Amended 20XX)**

19 **B1: CLM-18.1 W N.3.2. Transfer Standard Test and T.3. On Tests Using Transfer Standards**

20 **Item Under Consideration:**

21 Amend Handbook 44, Cryogenic Liquid-Measuring Devices Code as follows:

22 **N.3.2. Transfer Field Standard Test.** – When comparing a meter with a calibrated **transfer field** standard, the
 23 test draft shall be equal to at least the amount delivered by the device in two minutes at its maximum discharge
 24 rate, and shall in no case be less than 180 L (50 gal) or equivalent thereof. When testing uncompensated volumetric
 25 meters in a continuous recycle mode, appropriate corrections shall be applied if product conditions are abnormally
 26 affected by this test mode.
 27 **(Amended 1976 and 20XX)**

28 ~~**T.3. On Tests Using Transfer Standards.**— To the basic tolerance values that would otherwise be applied,~~
 29 ~~**there shall be added an amount equal to two times the standard deviation of the applicable transfer**~~
 30 ~~**standard when compared to a basic reference standard. (Added 1976)**~~

31 **B1: CDL-18.1 W N.3.2. Transfer Standard Test, T.3. On Tests Using Transfer Standards**

32 **Item Under Consideration:**

33 Amend Handbook 44, Carbon Dioxide Liquid-Measuring Devices Code as follows:

34 **N.3.2. Transfer Field Standard Test.** – When comparing a meter with a calibrated **transfer field** standard, the
 35 test draft shall be equal to at least the amount delivered by the device in two minutes at its maximum discharge
 36 rate.
 37 **(Amended 20XX)**

38 ~~**T.3. On Tests Using Transfer Standards.**— To the basic tolerance values that would otherwise be applied,~~
 39 ~~**there shall be added an amount equal to two times the standard deviation of the applicable transfer**~~
 40 ~~**standard when compared to a basic reference standard.**~~

1 **B1: HGM-18.1 W N.4.1. Master Meter (Transfer) Standard Test, T.4. Tolerance Application**
2 **on Test Using Transfer Standard Test Method**

3 **Item Under Consideration:**

4 Amend Handbook 44, Hydrogen Gas-Measuring Devices Tentative Code as follows:

5 **N.4.1. Master Meter (~~Transfer~~) Field Standard Test.** – When comparing a measuring system with a calibrated
6 ~~transfer field~~ standard, the minimum test shall be one test draft at the declared minimum measured quantity and
7 one test draft at approximately ten times the minimum measured quantity or 1 kg, whichever is greater. More
8 tests may be performed over the range of normal quantities dispensed.

9 (Amended 2021XX)

10 ~~**T.4. Tolerance Application on Test Using Transfer Standard Test Method.**— To the basic tolerance values~~
11 ~~**that would otherwise be applied, there shall be added an amount equal to two times the standard deviation**~~
12 ~~**of the applicable transfer standard when compared to a basic reference standard.**~~

13 **B1: GMA-18.1 W 5.56(a): N.1.1. Air Oven Reference Method Transfer Standards, N.1.3.**
14 **Meter to Like-Type Meter Method Transfer Standards and 5.56(b): N.1.1.**
15 **Transfer Standards, T. Tolerances¹**

16 **Item Under Consideration:**

17 Amend Handbook 44, Grain Moisture Meters Code as follows:

18 **5.56.(a) Grain Moisture Meters**

19 **N.1.1. Air Oven Reference Method ~~Transfer-Field~~ Standards.** – Official grain samples shall be used as the
20 official ~~transfer field~~ standards with moisture content and test weight per bushel values assigned by the reference
21 methods. The reference methods for moisture shall be the oven drying methods as specified by the USDA GIPSA.
22 The test weight per bushel value assigned to a test weight transfer standard shall be the average of 10 test weight
23 per bushel determinations using the quart kettle test weight per bushel apparatus as specified by the USDA
24 GIPSA. Tolerances shall be applied to the average of at least three measurements on each official grain sample.
25 Official grain samples shall be clean and naturally moist, but not tempered (i.e., water not added).

26 (Amended 1992, 2001, ~~and 2003,~~ and 20XX)

27 **N.1.3. Meter to Like-Type Meter Method Transfer Standards.** – Properly standardized reference meters using
28 National Type Evaluation Program approved calibrations shall be used as ~~transfer field~~ standards. A reference
29 meter shall be of the same type as the meter under test. Tests shall be conducted side-by-side using, as a
30 comparison medium, grain samples that are clean and naturally moist, but not tempered (i.e., water not added).

31 (Added 2001) (Amended 20XX)

32 **5.56.(b) Grain Moisture Meters**

33 **N.1.1. ~~Transfer~~ Field Standards.** – Official grain samples shall be used as the official ~~transfer field~~ standards
34 with moisture content values assigned by the reference methods. The reference methods shall be the oven drying
35 methods as specified by the USDA GIPSA. Tolerances shall be applied to the average of at least three
36 measurements on each official grain sample. Official grain samples shall be clean and naturally moist, but not
37 tempered (i.e., water not added).

38 (Amended 1992 and 20XX)

39 **T. Tolerances¹**

40 ¹These tolerances do not apply to tests in which grain moisture meters are the ~~transfer field~~ standards.

41 (Amended 20XX)

1 **B1: LVS-18.1 W N.2. Testing Standards**

2 **Item Under Consideration:**

3 Amend Handbook 44, Electronic Livestock, Meat and Poultry Evaluation Systems and/or Devices Code as follows:

4 **N.2. ~~Testing-Field~~ Standards.** – ASTM Standard F2343 requires device or system users to maintain accurate
5 **~~reference-field~~** standards that meet the tolerance expressed in NIST Handbook 44 Fundamental Considerations,
6 paragraph 3.2. Tolerances for Standards (i.e., one-third of the smallest tolerance applied).

7 **(Amended 20XX)**

8 **B1: OTH-18.1 W Appendix A: Fundamental Considerations, 3.2. Tolerances for Standards,**
9 **3.3. Accuracy of Standards**

10 **Item Under Consideration:**

11 Amend Handbook 44, Appendix A: Fundamental Considerations as follows:

12 **3.2. Tolerances for Field Standards.** – Except for work of relatively high precision, it is recommended that the
13 accuracy of standards used in testing commercial weighing and measuring equipment be established and
14 maintained so that the use of corrections is not necessary. When the standard is used without correction, its
15 combined error and uncertainty must be less than one-third of the applicable device tolerance.

16 Device testing is complicated to some degree when corrections to standards are applied. When using a correction
17 for a standard, the uncertainty associated with the corrected value must be less than one-third of the applicable
18 device tolerance. The reason for this requirement is to give the device being tested as nearly as practicable the
19 full benefit of its own tolerance.

20 **(Amended 20XX)**

21 **3.3. Accuracy of Field Standards.** – Prior to the official use of testing apparatus, its accuracy should invariably
22 be verified. Field standards should be calibrated as often as circumstances require. By their nature, metal
23 volumetric field standards are more susceptible to damage in handling than are standards of some other types. A
24 field standard should be calibrated whenever damage is known or suspected to have occurred or significant repairs
25 have been made. In addition, field standards, particularly volumetric standards, should be calibrated with
26 sufficient frequency to affirm their continued accuracy, so that the official may always be in an unassailable
27 position with respect to the accuracy of his testing apparatus. Secondary field standards, such as special fabric
28 testing tapes, should be verified much more frequently than such basic standards as steel tapes or volumetric
29 provers to demonstrate their constancy of value or performance.

30 Accurate and dependable results cannot be obtained with faulty or inadequate field standards. If either the service
31 person or official is poorly equipped, their results cannot be expected to check consistently. Disagreements can
32 be avoided, and the servicing of commercial equipment can be expedited and improved if service persons and
33 officials give equal attention to the adequacy and maintenance of their testing

34 **(Amended 20XX)**

35 **B1: OTH-18.2 W Appendix D – Definitions: fifth-wheel, official grain samples, transfer**
36 **standard and Standard, Field**

37 **Item Under Consideration:**

38 Amend Handbook 44, Appendix A: Fundamental Considerations as follows:

39 **fifth wheel.** – A commercially-available distance-measuring device which, after calibration, is recommended for use
40 as a field ~~transfer~~ standard for testing the accuracy of taximeters and odometers on rented vehicles. [5.53, 5.54]

41 **(Amended 20XX)**

1 **official grain samples.** – Grain or seed used by the official as the official ~~transfer field~~ standard from the reference
2 standard method to test the accuracy and precision of grain moisture meters. [5.56(a), 5.56(b)]

3 (Amended 20XX)

4 ~~transfer standard.— A measurement system designed for use in proving and testing cryogenic liquid measuring~~
5 ~~devices. [3.38]~~

6 **Standard, Field.** – **A physical standard that meets specifications and tolerances in NIST Handbook 105-series**
7 **standards (or other suitable and designated standards) and is traceable to the reference or working standards**
8 **through comparisons, using acceptable laboratory procedures, and used in conjunction with commercial**
9 **weighing and measuring equipment.**

10 (Added 20XX)

11 **Background and Discussion:**

12 The term transfer standard is currently defined in HB 44 as only being applicable to the Cryogenic Liquid Measuring
13 Devices Code. This definition should be removed as it is very limited in scope and the item termed a ‘transfer standard’
14 is in fact a robust working measurement standard used in field conditions, better termed and shortened to Field
15 Standard. All instruments/devices used as a Field Standard in the testing of Weighing and Measuring Devices,
16 regardless of nomenclature, must comply with the requirements of HB 44, Appendix A, Fundamental Considerations
17 Associated with the Enforcement of Handbook 44 Codes, paragraph 3.2 Testing Apparatus, Adequacy. Using the
18 term transfer standard as it is recently being applied in no way negates this requirement of adequacy and confuses the
19 user as to the nature of the field standard being used.

20 Use of the single word ‘standard’ to signify use of a field standard can be confusing as there are a number of different
21 meanings associated with ‘standard’. It could be a documentary standard, i.e., HB 44; a primary standard used to
22 realize the SI, i.e., Watt Balance; a laboratory reference standard used to ensure traceability of laboratory
23 measurements to the SI, i.e., NIST calibrated laboratory standards; a laboratory check standard used to monitor the
24 laboratory process. Use of the single word ‘standard’ requires that the reader understand completely the context of its
25 use. Instead using the term Field Standard ensures that the reader understands that the item described is a robust
26 working standard used in field conditions to ensure traceability of the subordinate measurements to the SI and leaves
27 no ambiguity in its meaning.

28 Thus, the recommended changes to HB 44 align that document with the HB 130, removing ambiguity and adding
29 clarity to the use of Field Standards for device testing.

30 Handbook 130 does NOT contain the term transfer standard in any location and already contains the definition and
31 appropriate use of the term Field Standard in the following locations:

32 1.12. Standard, Field. – A physical standard that meets specifications and tolerances in NIST Handbook 105-series
33 standards (or other suitable and designated standards) and is traceable to the reference or working standards through
34 comparisons, using acceptable laboratory procedures, and used in conjunction with commercial weighing and
35 measuring equipment. (Added 2005)

36 Uniform Weights and Measures Law

37 Section 3. Physical Standards

38 Weights and measures that are traceable to the U.S. prototype standards supplied by the Federal Government, or
39 approved as being satisfactory by NIST, shall be the state reference and working standards of weights and measures,
40 and shall be maintained in such calibration as prescribed by the NIST as demonstrated through laboratory accreditation
41 or recognition. All field standards may be prescribed by the Director and shall be verified upon their initial receipt and
42 as often thereafter as deemed necessary by the Director. (Amended 2005)

43 Section 12. Powers and Duties of the Director

44 The Director shall:

1 ...

2 (h) verify the field standards for weights and measures used by any jurisdiction within the state, before being put into
 3 service, tested annually or as often thereafter as deemed necessary by the Director based on statistically evaluated
 4 data, and approve the same when found to be correct; (Amended 2005)

5 Uniform Regulation for the Voluntary Registration of Servicepersons and Service Agencies for Commercial Weighing
 6 and Measuring Devices

7 Section 1. Policy

8 For the benefit of the users, manufacturers, and distributors of commercial weighing and measuring devices, it shall
 9 be the policy of the Director of Weights and Measures, hereinafter referred to as “Director,” to accept registration of
 10 (a) an individual and (b) an agency providing acceptable evidence that he, she, or it is fully qualified by training or
 11 experience to install, service, repair, or recondition a commercial weighing or measuring device; has a thorough
 12 working knowledge of all appropriate weights and measures laws, orders, rules, and regulations; and has possession
 13 of, or has available for use, and will use suitable and calibrated weights and measures field standards and testing
 14 equipment appropriate in design and adequate in amount. (An employee of the government shall not be eligible for
 15 registration.)

16 The Director will check the qualifications of each applicant. It will be necessary for an applicant to have available
 17 sufficient field standards and equipment (see Section 5, Minimum Equipment).

18 Section 9. Examination and Calibration or Certification of Standards and Testing Equipment All field standards that
 19 are used for servicing and testing weights and measures devices for which competence is registered shall be submitted
 20 to the Director for initial and subsequent verification and calibration at intervals determined by the Director. A
 21 registered serviceperson or registered service agency shall not use in servicing commercial weighing or measuring
 22 devices any field standards or testing equipment that have not been calibrated or verified by the Director. In lieu of
 23 submission of physical standards, the Director may accept calibration and/or verification reports from any laboratory
 24 that is formally accredited or recognized. The Director shall maintain a list of organizations from which the state will
 25 accept calibration reports. The state shall retain the right to periodically monitor calibration results and/or to verify
 26 field standard compliance to specifications and tolerances when field standards are initially placed into service or at
 27 any intermediate point between calibrations. (Added 1966) (Amended 1984, 1999, and 2005) The Committee received
 28 written comments on all items in Block 4 and Block 5, as well as LPG-4 and MFM-2 emphasizing the need for there
 29 to be more study and discussion of the issues to assess the ramifications of all the proposed changes. The Committee
 30 also received written comments from the SMA that it looks forward to further information on these items and stating
 31 that it is important to be consistent in our use of terms across multiple sections of NIST Handbook 44. The Committee
 32 agreed to carryover this group of items on its 2019 agenda to allow for further discussion and development of these
 33 proposals.

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 36 proposed changes. The Committee also received written comments from the SMA that it looks forward to further
 37 information on these items and stating that it is important to be consistent in our use of terms across multiple sections
 38 of NIST Handbook 44. The Committee agreed to carryover this group of items on its 2019 agenda to allow for further
 39 discussion and development of these proposals.

40 NCWM 2019 Interim Meeting: The S&T Committee decided to combine the items on the agenda dealing with the
 41 issue of transfer standard (including items already combined into blocks) into one block. Block 1 (New) of the Interim
 42 Meeting report now includes GEN-3, Block 1 (original items from the 2019 interim agenda that appeared under Block
 43 1), Block 2, LPG-3, and MFM-5, which were all separate items and blocks of items on the S&T Committee’s 2019
 44 Interim Meeting agenda (NCWM Publication 15). Agenda items GEN-3, Block 1, Block 2, LPG-3, and MFM-5 are
 45 listed separately on the Interim agenda with a note added beneath each individual item referring the reader to the New
 46 B1 items. All items under this New B1 have retained the same numbering system for ease in referring to the appendix
 47 for discussion on each item.

1 NCWM 2019 Annual Meeting: Mr. Brett Gurney (NCWM Chairman) commented regarding the formation of a Task
2 Group assigned to further develop this block proposal. The TG is charged with providing definitions for various types
3 of standards (transfer, field, reference, etc.) as well as the criteria to be met by these types of standards. The completion
4 date given to the TG is July 2021. The Committee agreed to the Assigned status for this block of items and looks
5 forward to hearing updates from the TG. The Chair of the task group was:

6 Mr. Jason Glass
7 Kentucky Department of Agriculture
8 502-573-0282, jason.glass@ky.gov

9 NCWM 2020 Interim Meeting: Field Standard TG Chair Jason reported that the Task Group met prior to the Interim
10 meeting and has begun discussion of the items under Block 1. Mr. Glass stated that bi-weekly teleconference meetings
11 were scheduled and that the group was optimistic but had significant work to accomplish.

12 Mr. Russ Vires (SMA) supports the Scale item, SCL 18.1; in this block, Mr. Dimitri Karimov (Meter Manufacturers
13 Association) supports the Task Group activities, Ms. Tina Butcher was encouraged with the progress on terminology
14 and provided an update on the Mass Flow Meter testing reporting that field testing was conducted October 28 to
15 November 1, 2019 and that State and Industry participation included Colorado, Florida, Oregon, Emerson, and Tulsa
16 Gas Technology.

17 Mr. Kurt Floren (Los Angeles Co., CA) raised concerns with GEN-19.1. regarding the definition of “Standard, Field”
18 and its reference to “stable” standards and how long a standard is expected to be stable, which is typically 1-year, for
19 which he believes should be longer. Mr. Floren also questioned the statement in the definition “tested over a range of
20 environmental and operational conditions that the measuring devices is used...” Mr. Floren noted that he was unsure
21 if all laboratories will have the capabilities to test over this wide range of conditions. Mr. Floren also expressed
22 concerns with the definition “Standard, Transfer” citing that this standard may not meet the fundamental
23 considerations requirement for standards over a long period of time or wide range of environmental conditions.

24 Mr. Steve Harrington (Oregon) echoed Mr. Floren’s comments. Field Standard TG Chair Glass responded that these
25 are concerns of the TG and these issues will be discussed and considered as the TG develops these items.

26 During the Committee’s work session, the Committee agreed that this item should remain an Assigned item.

27 2021 NCWM Interim Meeting: NCWM Field Standard TG Chair, Jason Glass provided an update on the Task Group
28 activities. Mr. Glass reported that the field standard Task Group is following the activities of the NIST Master Meter
29 Project and that the Task Group reviewed API specifications for use of master meters as a standard and a test protocol
30 that will be used to ensure uniformity in collecting data on master meters used as field standards. He also reported
31 that the TG does not have a recommendation for this item. Mr. Glass also reported that he would be stepping down
32 as the TG Chair. Mr. Mike Keilty (Endress+Hauser AG) thanked Chair Glass and the TG for their work and requested
33 that Block 1, LPG-15.1, N.3. and Block 1 MFM-15.1, N.3 be removed from Block 1 items and to allow those items
34 to move forward separate from the other Block 1 Items. Mr. Keilty stated that similar language was added to the
35 Hydrogen code and that the proposed language in LPG-15.1 N.3. and MFM-15.1, N.3 will allow for the recognition
36 of master meters as field standards. Mr. Henry Oppermann (WM-Consulting), stated that data is needed to ensure that
37 master meters can be used over a range of conditions. Mr. Robert Murnane (Seraphin) stated that jurisdictions have
38 the ability to use meters and that Block 1 LPG-15.1, N.3 and Block 1 MM-15.1, N.3 should remain in Block 1 until
39 data is available to support the use of master meters as a standard. Mr. Keilty mentioned that there has been useful
40 dialog regarding master meters in the TG, but that he is concerned that the TG is not close to deciding and he expressed
41 concerns with the TG’s focus on the NIST Master Meter Project. Mrs. Tina Butcher (NIST OWM) provided an update
42 on the NIST Master Meter Project and noted that States have the regulatory powers to accept or reject a standard. She
43 also mentioned that NIST is working with States to collect data needed to assess master meters and preliminary testing
44 was conducted and data was collected on CNG at Tulsa Gas Technology’s facility in fall 2019. Ms. Diane Lee (NIST
45 OWM) noted that NIST OWM feels that it is premature to add more language to the Handbook 44 on master meters
46 without data to support its use.

47 During the Committee’s work session, the Committee agreed to keeps all items in Block 1 and that this item should
48 remain with an Assigned status.

1 NCWM 2021 Annual Meeting: Mr. Glass reported that he would be stepping down as the Field Standard TG Chair.
 2 The Committee heard updates from members of the Task Group during open hearings. Mr. Michael Keilty noted that
 3 two of the items had been on the agenda since 2015 and requested that they be removed from the block and
 4 recommended recognizing the use of master meters. Other comments were to keep the items together until data is
 5 analyzed from the NIST Field Reference Standard Work Group to support the use of master meters but that if some
 6 items were removed from the block, all items should be removed from the block. Based on comments heard during
 7 the 2021 Annual Meeting, the S&T Committee recommended that all items that were included in Block 1
 8 “Terminology For Testing Standards” that originally appeared as a separate item or a separate block of items on the
 9 S&T agenda in and prior to 2019, be removed from Block 1 “Terminology For Testing Standards” and appear as
 10 originally presented.

11 During the 2021 Committee work session the Committee recognized that the Task Group has accomplished all it is
 12 able to at this point and is recommending the Task Group be disbanded and will make said recommendation to the
 13 NCWM Chairman. The Committee agreed to break all items in Block 1 into individual items and designate them all
 14 as Developing. The Committee thanks the Task Group and its members for their work.

15 NCWM 2022 Interim Meeting: Ms. Diane Lee (NIST, submitter) provided written comments recommending
 16 withdrawal of the block. Ms. Lee spoke during open hearings to explain that while the items have merit and will
 17 continue to be worked on, they should be withdrawn at this time while the language and terms are aligned with other
 18 items in the handbook.

19 Written comments were received from Mr. Russ Vires, representing the Scale Manufacturers Association (SMA). Mr.
 20 Vires (representing the SMA) also spoke during the open hearing to express the support for further development.
 21 Additional comments were heard from regulatory officials recommending development of the block items.

22 During the S&T Committee work session, the committee agreed to recommend this item for withdrawal to allow for
 23 the submitter to continue work on this item and allow for alignment as other related items in the Handbook are
 24 developed and move forward.

25 **Regional Associations’ Comments:**

26 WWMA 2021 Annual Meeting: Russell Vires (Mettler Toledo): there are some conflicts now that GEN-19.1 has been
 27 removed (from the block). OTH-18.1: some conflicts there. This needs additional work. Recommend that it remains
 28 developing to give stakeholders opportunity to properly vet item. Diane Lee (NIST OWM): Russ is correct. Previous
 29 agenda - OTH-18.1 was listed as a separate item on the agenda but it has always been a part of block 1 (concern
 30 raised). That is fixed and 18.1 is included. What do we call master meters? What do we call transfer standards? NIST
 31 wants to call everything a field standard. All items were in a block - 18.1 should remain in the block but it was
 32 removed. NIST supports developing. Kurt Floren (LA County): won’t comment on tech. aspects. Question on status?
 33 SCL-18.1 and OTH-18.3: these are shown as assigned items. Have they been assigned to a task force? Are they still
 34 in the hands of NIST? Need to define the terms (field standard and transfer standard). Josh Nelson (Ex-Officio NCWM
 35 S&T Committee): to Kurt - it had previously been assigned but the task group disbanded to allow NIST to continue
 36 their work on the questions at hand. They are looking to have members of that group to join the NIST group to gain
 37 more understanding. This is a typo - should be changed to developmental. Matt Douglas (California - DMS):
 38 California supports further development. Cadence Matijevich (Nevada) : NIST HB 105 - may be a useful reference
 39 doc. To look at the definitions. To avoid conflict bet. HB44 and HB105.
 40

41 The WWMA S&T Committee recommends the status remain developmental.

42 SWMA 2021 Annual Meeting: Mr. Oppermann, Weights and Measures Consulting, Seraphin, stated that you can’t
 43 call everything a Field Standard, and that he supports this item remaining Developing so the group can work with
 44 OWM to align their terminology. Russ Vires, SMA, stated they support SCL/ABW/AWS because it is important to
 45 use consistent terminology across Handbook 44. Russ Vires, Mettler Toledo, stated that this item conflicts with Gen
 46 19.1, and that he supported this item remaining Developing. This committee feels that more work needs to be done
 47 on this item regarding consistent terminology.

48 This committee recommends this item remain Developing pending the Field Standard Task Group finding a new
 49 Chairperson.

1 CWMA 2021 Interim Meeting: Diane Lee-NIST mentioned that other items have been taken out of this block. Will
2 be working with Seraphin to come up with better language. Is maybe “Meter” more suitable. Should stay has
3 developing. Tina Butcher-NIST submitted OTH 22.1 and will help develop more. Lou Straub-SMA can support
4 ABW-18.1 and AWS-18.1. Charles Stutesman-Kansas has issues with term “master meter”. Ivan Hankins-Iowa Why
5 can’t we use the term “prover” doesn’t understand “transfer meter or master meter”.

6
7 CWMA S&T Committee recommends item as developing.

8 NEWMA 2021 Interim Meeting: Henry Opperman (W&M Consulting/Seraphin) commented that this item should
9 remain a developing item along with continued discussions with NIST OWM. Lou Straub (SMA) supports the
10 proposal as it applies to the items SCL-18.1, ABW-18.1, and AWS-18.1 items, and looks forward to further
11 development by the Task Group. Henry Opperman (Seraphin) commented that this block originally contained (Gen
12 19.1) that was separated from the block and recommends further development.

13 The NEWMA Specifications and Tolerances Committee recommends that this item remain in Developing Status.

14 Additional letters, presentation and data may have been submitted for consideration with this item. Please refer to
15 <https://www.ncwm.com/publication-16> to review these documents.

16 **BLOCK 2 ITEMS (B2) DEFINE TRUE VALUE FOR USE IN ERROR**
17 **CALCULATIONS**

18 **NOTES:**

- 19 1. At the 2020 NCWM Interim Meeting the committee agreed that GEN-20.1, SCL-20.1 and SCL-20.2 should
20 be removed from Block 2 and given individual consideration. The items included in this block 2 are SCL-
21 20.3, SCL-20.4, SCL-20.5, SCL-20.6, SCL-20.7 and SCL-20.8.
22 2. While this item was carried over from the 2020 Interim Meeting, it was not a voting item and therefore not
23 discussed during the continuation of the 2020 Annual Meeting. Instead, it was placed on the 2021 Interim
24 Meeting’s agenda and was discussed during that meeting.

25 **Source:**

26 Ross Andersen (Retired)

27 **Purpose:**

28 This proposal has four parts:

- 29 1. Clarify the concepts in determining error in verification,
30 2. Correct Code references to ensure correct reference to either e or d, as appropriate,
31 3. Correct Code references regarding issues of scale suitability Table 8, and
32 4. Explain why e and d are not connected

33 **B2: SCL-20.3 A S.5.4. Relationship of Minimum Load Cell Verification Interval to the Scale**
34 **Division**

35 **Item Under Consideration:**

36 Amend Handbook 44, Scales Code as follows:

37 **S.5.4. Relationship of Minimum Load Cell Verification Interval Value to the Scale Division** – The relationship
38 of the value for the minimum load cell verification scale interval, v_{min} , to the verification scale division, d_e , for a
39 specific scale using National Type Evaluation Program (NTEP) certified load cells shall comply with the
40 following formulae where N is the number of load cells in a single independent¹ weighing/load-receiving element
41 (such as hopper, railroad track, or vehicle scale weighing/load-receiving elements):
42

1 (a) $v_{min} \leq \frac{d \cdot e}{\sqrt{N}}$ for scales without lever systems; and

2 (b) $v_{min} \leq \frac{d \cdot e}{\sqrt{N} \times (\text{scale multiple})}$ for scales with lever systems.

3
4
5 *“Independent” means with a weighing/load-receiving element not attached to adjacent elements and with its own*
6 *A/D conversion circuitry and displayed weight.*

7 ~~*[*When the value of the scale division, d, is different from the verification scale division, e, for the scale, the value*~~
8 ~~*of e must be used in the formulae above.]*~~

9 *This requirement does not apply to complete weighing/load-receiving elements or scales, which satisfy all the*
10 *following criteria:*

- 11 - *the complete weighing/load-receiving element or scale has been evaluated for compliance with*
12 *T.N.8.1. Temperature under the NTEP;*
- 13 - *the complete weighing/load-receiving element or scale has received an NTEP Certificate of*
14 *Conformance; and*
- 15 - *the complete weighing/load-receiving element or scale is equipped with an automatic zero-tracking*
16 *mechanism which cannot be made inoperative in the normal weighing mode. (A test mode which*
17 *permits the disabling of the automatic zero-tracking mechanism is permissible, provided the scale*
18 *cannot function normally while in this mode.*

19 *[Nonretroactive as of January 1, 1994]*
20 *(Added 1993) (Amended 1996, and 2016, and 20XX)*

CWMA Report: B2: SCL-20.3
<p>Regional recommendation to NCWM on item status:</p> <p><input type="checkbox"/> Recommend as a Voting Item on the NCWM agenda</p> <p><input type="checkbox"/> Recommend as an Information Item on the NCWM agenda</p> <p><input checked="" type="checkbox"/> Recommend as an Assigned Item on the NCWM agenda <i>(To be developed by an NCWM Task Group or Subcommittee)</i></p> <p><input type="checkbox"/> Recommend as a Developing Item on the NCWM agenda <i>(To be developed by source of the proposal)</i></p> <p><input type="checkbox"/> Recommend Withdrawal of the Item from the NCWM agenda <i>(In the case of new proposals, do not forward this item to NCWM)</i></p> <p><input type="checkbox"/> No recommendation from the region to NCWM <i>(If this is a new proposal, it will not be forwarded to the national committee by this region)</i></p>
<p>Comments and justification for the regional recommendation to NCWM: (This will appear in NCWM reports)</p> <p>Russ Vires – SMA - The SMA supports the further development of this item and the work of the Verification Scale Division (e) Task Group. Recommendation: The SMA would also like to encourage the use of the terminology “Verification Interval” for “e” and “Scale Division” for “d” in every instance that it appears in this item.</p> <p>Loren Minich – KS - Items shown under consideration are not the items the task group has submitted. The SMA recommendations conflict with current task group verbiage.</p> <p>Doug Musick – KS – This proposal got put into the National Committee Agenda Appendix for some reason. Hope to rebuild the task group and get cleaned up before 2022 national. “verification interval” should be “verification</p>

scale division” (e), and “displayed scale division” (d). Having (d) and (e) in the same original table was confusing to inspectors. The current task group changes won’t be in Pub 16 for the 2022 National meeting.

Loren Minich – KS - Prefers the S&T committee to evaluate the Appendix since it’s more up to date.

The CWMA S&T Committee recommends this item remain as assigned.

1 **B2: SCL-20.4 A Table 3. Parameters of Accuracy Classes.**

2 **Item Under Consideration:**

3 Amend Handbook 44, Scales Code as follows:

Table 3. Parameters for Accuracy Classes			
Class	Value of the Verification Scale Division e^1 (d or e^t)	Number of Scale⁴ Divisions (n)	
		Minimum	Maximum
SI Units			
<i>I</i>	<i>equal to or greater than 1 mg</i>	<i>50 000</i>	<i>--</i>
<i>II</i>	<i>1 to 50 mg, inclusive</i>	<i>100</i>	<i>100 000</i>
	<i>equal to or greater than 100 mg</i>	<i>5 000</i>	<i>100 000</i>
<i>III^{2,5}</i>	<i>0.1 to 2 g, inclusive</i>	<i>100</i>	<i>10 000</i>
	<i>equal to or greater than 5 g</i>	<i>500</i>	<i>10 000</i>
<i>III L³</i>	<i>equal to or greater than 2 kg</i>	<i>2 000</i>	<i>10 000</i>
<i>III</i>	<i>equal to or greater than 5 g</i>	<i>100</i>	<i>1 200</i>
U.S. Customary Units			
<i>III⁵</i>	<i>0.0002 lb to 0.005 lb, inclusive</i>	<i>100</i>	<i>10 000</i>
	<i>0.005 oz to 0.125 oz, inclusive</i>	<i>100</i>	<i>10 000</i>
	<i>equal to or greater than 0.01 lb</i>	<i>500</i>	<i>10 000</i>
	<i>equal to or greater than 0.25 oz</i>	<i>500</i>	<i>10 000</i>
<i>III L³</i>	<i>equal to or greater than 5 lb</i>	<i>2 000</i>	<i>10 000</i>
<i>III</i>	<i>greater than 0.01 lb</i>	<i>100</i>	<i>1 200</i>
	<i>greater than 0.25 oz</i>	<i>100</i>	<i>1 200</i>

¹ **For Class I and II devices equipped with auxiliary reading means (i.e., a rider, a vernier, or a least significant decimal differentiated by size, shape, or color), the value of the verification scale division “e” is the value of the scale division immediately preceding the auxiliary means. The manufacturer may design a scale such that the verification scale division e does not be equal to the scale division d. To ensure the correct value for e is used, refer to marking requirements in footnotes 3 and 4 to Table S.6.3.a. and Table S.6.3.b. (Amended 20XX)**

² A Class III scale marked “For prescription weighing only” may have a verification scale division (e) not less than 0.01 g.
(Added 1986) (Amended 2003)

³ The value of **a the verification** scale division (e) for crane and hopper (other than grain hopper) scales shall be

<p>Table 3. Parameters for Accuracy Classes</p>
<p>not <u>be</u> less than 0.2 kg (0.5 lb). The minimum number of scale divisions shall not <u>be</u> less than 1000. (Amended 20XX)</p>
<p>⁴ On a multiple range or multi-interval scale, the number of divisions for each range independently shall not exceed the maximum specified for the accuracy class. The number of scale divisions, n, for each weighing range is determined by dividing the scale capacity for each range by the verification scale division, e, for each range. On a scale system with multiple load-receiving elements and multiple indications, each element considered shall not independently exceed the maximum specified for the accuracy class. If the system has a summing indicator, the n_{max} for the summed indication shall not exceed the maximum specified for the accuracy class. (Added 1997)</p>
<p>⁵ The minimum number of scale divisions for a Class III Hopper Scale used for weighing grain shall be 2000.)</p>

[Nonretroactive as of January 1, 1986]
(Amended 1986, 1987, 1997, 1998, 1999, 2003, ~~and~~ 2004, and 20XX)

<p>CWMA Report: B2: SCL-20.4</p>
<p>Regional recommendation to NCWM on item status:</p> <ul style="list-style-type: none"> <input type="checkbox"/> Recommend as a Voting Item on the NCWM agenda <input type="checkbox"/> Recommend as an Information Item on the NCWM agenda <input checked="" type="checkbox"/> Recommend as an Assigned Item on the NCWM agenda <i>(To be developed by an NCWM Task Group or Subcommittee)</i> <input type="checkbox"/> Recommend as a Developing Item on the NCWM agenda <i>(To be developed by source of the proposal)</i> <input type="checkbox"/> Recommend Withdrawal of the Item from the NCWM agenda <i>(In the case of new proposals, do not forward this item to NCWM)</i> <input type="checkbox"/> No recommendation from the region to NCWM <i>(If this is a new proposal, it will not be forwarded to the national committee by this region)</i>
<p>Comments and justification for the regional recommendation to NCWM: <i>(This will appear in NCWM reports)</i></p> <p>Russ Vires – SMA - The SMA recommends the following change to Table 3, Footnote 1: <i>Class I and II scales may be designed <u>such that the verification scale division verification interval e does not be equal to the scale division d.</u></i></p>

1 **B2: SCL-20.5 A Table S.6.3.a. Marking Requirements, Note 3.**

2 **Item Under Consideration:**
3 Amend Handbook 44, Scales Code as follows:

- 4 3. The device shall be marked with the nominal capacity. *The nominal capacity shall be shown together with the*
5 *value of the scale division “d” (e.g., 15 × 0.005 kg, 30 × 0.01 lb, or capacity = 15 kg, d = 0.005 kg) in a clear*
6 *and conspicuous manner and be readily apparent when viewing the reading face of the scale indicator unless*
7 *already apparent by the design of the device. Each scale division value ~~or weight unit~~ with its associated*
8 *nominal capacity shall be marked on multiple range or multi-interval scales. In the absence of a separate*
9 *marking of the verification scale division “e” (see Note 4), the value of the verification scale division e shall*
10 *be equal to the value of the scale division d.*

11 [Nonretroactive as of January 1, 1983]
12 (Amended 2005 and 20XX)

13

CWMA Report: B2: SCL-20.5	
Regional recommendation to NCWM on item status:	
<input type="checkbox"/> Recommend as a Voting Item on the NCWM agenda <input type="checkbox"/> Recommend as an Information Item on the NCWM agenda <input checked="" type="checkbox"/> Recommend as an Assigned Item on the NCWM agenda <i>(To be developed by an NCWM Task Group or Subcommittee)</i> <input type="checkbox"/> Recommend as a Developing Item on the NCWM agenda <i>(To be developed by source of the proposal)</i> <input type="checkbox"/> Recommend Withdrawal of the Item from the NCWM agenda <i>(In the case of new proposals, do not forward this item to NCWM)</i> <input type="checkbox"/> No recommendation from the region to NCWM <i>(If this is a new proposal, it will not be forwarded to the national committee by this region)</i>	
Comments and justification for the regional recommendation to NCWM: (This will appear in NCWM reports)	

1 **B2: SCL-20.6 A T.N.1.2. Accuracy Classes and T.N.1.3. Scale Division.**

2 **Item Under Consideration:**

3 Amend Handbook 44, Scales Code as follows:

4 T.N.1.2. Accuracy Classes. – Weighing devices are divided into accuracy classes according to the number of scale
 5 divisions (n) and the value of the verification scale division (\oplus) (e).

6 T.N.1.3. Scale Division. – **This Code contains references to two types of scale divisions, the verification scale**
 7 **division (e) and the scale division (d) (see definitions in Appendix D.).** The tolerance for a weighing device is **in**
 8 **the order of magnitude of related to the value of the scale division (d) or the value of** the verification scale division
 9 (e) and is generally expressed in terms of ~~d~~ **or e.** **Other technical requirements may reference either the**
 10 **verification scale division (e) or scale division (d) as appropriate. The values of (e) and (d) are chosen by the**
 11 **manufacturer and are marked on the device pursuant to S.6.3., except that d is not used in reference to an**
 12 **analog device, such as an equal-arm balance, where the graduations do not correspond to units of weight.**

CWMA Report: B2: SCL-20.6	
Regional recommendation to NCWM on item status:	
<input type="checkbox"/> Recommend as a Voting Item on the NCWM agenda <input type="checkbox"/> Recommend as an Information Item on the NCWM agenda <input checked="" type="checkbox"/> Recommend as an Assigned Item on the NCWM agenda <i>(To be developed by an NCWM Task Group or Subcommittee)</i> <input type="checkbox"/> Recommend as a Developing Item on the NCWM agenda <i>(To be developed by source of the proposal)</i> <input type="checkbox"/> Recommend Withdrawal of the Item from the NCWM agenda <i>(In the case of new proposals, do not forward this item to NCWM)</i> <input type="checkbox"/> No recommendation from the region to NCWM <i>(If this is a new proposal, it will not be forwarded to the national committee by this region)</i>	
Comments and justification for the regional recommendation to NCWM: (This will appear in NCWM reports)	
Russ Vires – SMA - The SMA recommends the following change: “... <u>except that (d) is not used in reference...</u> ”	

1 **B2: SCL-20.7 A Table 7. Maintenance Tolerances**

2 **Item Under Consideration:**

3 Amend Handbook 44, Scales Code as follows:

Table 6.				
Maintenance Tolerances				
(All values in this table are in <u>verification</u> scale divisions)				
Tolerance in <u>Verification</u> Scale Divisions				
	1	2	3	5
Class	Test Load			
I	0 - 50 000	50 001 - 200 000	200 001 +	
II	0 - 5 000	5 001 - 20 000	20 001 +	
III	0 - 500	501 - 2 000	2 001 - 4 000	4 001 +
III L	0 - 50	51 - 200	201 - 400	401 +
III L	0 - 500	501 - 1 000	(Add 1 μ g for each additional 500 μ g or fraction thereof)	
CWMA Report: B2: SCL-20.7				
Regional recommendation to NCWM on item status:				
<input type="checkbox"/> Recommend as a Voting Item on the NCWM agenda <input type="checkbox"/> Recommend as an Information Item on the NCWM agenda <input checked="" type="checkbox"/> Recommend as an Assigned Item on the NCWM agenda <i>(To be developed by an NCWM Task Group or Subcommittee)</i> <input type="checkbox"/> Recommend as a Developing Item on the NCWM agenda <i>(To be developed by source of the proposal)</i> <input type="checkbox"/> Recommend Withdrawal of the Item from the NCWM agenda <i>(In the case of new proposals, do not forward this item to NCWM)</i> <input type="checkbox"/> No recommendation from the region to NCWM <i>(If this is a new proposal, it will not be forwarded to the national committee by this region)</i>				
Comments and justification for the regional recommendation to NCWM: <i>(This will appear in NCWM reports)</i>				
Russ Vires – SMA - The SMA recommends the following change: Table 6. Maintenance Tolerances				

4 **B2: SCL-20.8 A Table 8. Recommended Minimum Load**

5 **Item Under Consideration:**

6 Amend Handbook 44, Scales Code as follows:

Table 8.		
Recommended Minimum Load		
Class	Value of Scale Division (d or e*)*	Recommended Minimum Load (d or e*)*
I	equal to or greater than 0.001 g	100
II	0.001 g to 0.05 g, inclusive	20
III	equal to or greater than 0.1 g	50
III L	All**	20
III L	All	50

III	All	10
<p>*For Class I and II devices equipped with auxiliary reading means (i.e., a rider, a vernier, or a least significant decimal differentiated by size, shape or color), the value of the verification scale division “e” is the value of the scale division immediately preceding the auxiliary means. For Class III and III devices the value of “e” is specified by the manufacturer as marked on the device; “e” must be less than or equal to “d.” Scales manufacturers are permitted to design scales where the value a verification scale division e differs from the displayed scale division d. If the marked value of e is less than the value of d, use e in interpreting the Table. In all other cases use the value of d. Refer to marking requirements for d and e in footnotes 3 and 4 to Table S.6.3.a. and Table S.6.3.b.</p> <p><u>(Amended 20XX)</u></p> <p>**A minimum load of 10 \neq e is recommended for a weight classifier marked in accordance with a statement identifying its use for special applications.</p>		

(Amended 1990) (Amended 20XX)

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Background/Discussion:

These items have been assigned to the newly formed Verification Scale Division (e) Task Group for further development. For more information or to provide comment, please contact the task group chair:

Mr. Doug Musick
 Kansas Department of Agriculture
 785-564-6681, doug.musick@ks.gov

Most scales under the Scales Code are designated by the manufacturer to have a value of e that equals d. Where e and d are not equal, there has been confusion in interpreting the Scales Code since the Code was adopted in 1984 (taking effect in 1986). This confusion came to the forefront with the needs arising from the cannabis trade. I believe that there were errors in translating OIML R76 (the basis of the current Scales Code) to HB44 format, there were key issues that were lost in translation, and finally there is misunderstanding of the HB44 Code that contributed to this confusion. This proposal will seek to identify the sources of confusion and offer revisions to make correction.

In this discussion I will be using the OIML term instrument when referencing a complete scale or weighing system. This eliminated the dual meaning of the term “device.” A device will only refer to functioning parts of an instrument. Finally, the term “scale” will not be a weighing instrument. Scale will refer only to the measurement scale, i.e., analog graduations or digital divisions.

1. Determining Error in Verification

GEN-20.1.

In 2017, item 3200-7, a proposal to revise the expression of tolerances in several codes, was considered and withdrawn by the S&T Committee. The proposal aimed to correct the missing reference in those codes to errors of overregistration and underregistration. It also included a change to the definition of overregistration and underregistration that was prompted in part to a lack of understanding of the process of verification. Many of the comments received indicated that it was better handled through training. Additionally, the NCWM is working on the issue of alternative test methods which directly impacts the subject of verification. In reviewing the 2017 proposal again, I believe the real problem is a misunderstanding of the process of verification itself, stemming from a missing definition for “True Value.”

The new definition and changes to the General Code correct deficiencies in the code. The “true value” has never been clearly defined in code although it may be inferred from the definitions. The concept of true value is essential to understanding verification process as it is used throughout the Handbook. It is also a legal issue establishing the basis for tolerance decisions with the uncertain test procedure clearly stated. Our decisions are based on the true value derived from a traceable standard and not based on the standard itself. Once established, the true value is considered to have no error for purposes of legal verification. In our tests, the uncertainties in the test procedure are unquantified. If you have to defend your test in court and are asked about the uncertainty in your test, what will you answer? With the addition of the True Value definition, you have a traceable test report for your standard and the text of G-T.3.

1 regarding the legality of the specified test procedure. The verification process formally addresses the risks in two
 2 ways. First the risks are kept small by the standard and procedure specified. Second, the risks are shared equally
 3 between buyers and sellers. The enhancements explain clearly how errors are computed and how they are interpreted.

4 The addition of a % error definition in G-T.3. corrects a deficiency that was identified in testing LMD's. The tolerances
 5 in the LMD codes are expressed using errors of overregistration /underregistration (device indication – true value).
 6 Yet we in the US traditionally calculate those errors as errors of excess/deficiency (true value – device indication).
 7 When calculating % error in these calculations, it seemed appropriate to put the device indication in the denominator,
 8 but this is incorrect. All error calculations must be in terms of the true value, especially % calculations.

9 SCL-20.1

10 The addition of the Note addresses the issue of digital rounding. Parallel to R 76, the note requires errors to be
 11 determined to a resolution of at least 0.2 e. Remember that error = indication – true value, and the true value is normally
 12 the nominal value of the test weight. That means determining the indication to a resolution of 0.2 e or finer using error
 13 weights or other means when $e \geq 2d$, or by directly reading the indications when $e \geq 5d$. This means if $e = 5d$ or e
 14 $= 10d$, the indication is resolved fine enough to reduce the rounding error. In R76, the requirement is to “eliminate”
 15 rounding error, but this is not possible. You can only reduce it to 0.5 of whatever division size you resolve the
 16 indication. Hence, the proposal uses the term “reduce” instead of “eliminate.” The waiver allows field inspectors to
 17 continue to use direct reading when $e = d$, with a resulting rounding error of 0.5 e. This accepts the additional risk of
 18 passing devices outside the tolerances. (See section 4 of the proposal)

19 The changes to the two Scales Code tolerance paragraphs create a specific reference to the type of error in G-T.3. In
 20 this case it formally states errors are errors of overregistration/underregistration. The other change in T.1.1. addresses
 21 the missing part about applying tolerances to net values as well as gross values for unmarked scales. I believe this was
 22 just an oversight in 1984, as applying tolerances to either gross or net loads had been the established practice long
 23 before the 1984 changes to the Scales Code.

24 **2. Correct Code references to ensure correct reference to either e or d, as appropriate.**

25 SCL-20.2

26 Section S.1.2.2. is not dealing with the verification scale division e as the title implies. Instead, it is dealing with
 27 special requirements for instruments designed such that e does not equal d.

28 Section S.1.2.2.2. is not a specification issue directed to the manufacturer, but rather a question of suitability. It should
 29 have been put into the User Requirements section 1. Selection Requirements. For a discussion of the option to delete
 30 this refer to part 4 of the proposal.

31 SCL-20.3

32 The correct value for the table is e. The use of d in the formulas only works when $e = d$. That is addressed in the note
 33 * below, which is not necessary when e is used in the formulas.

34 SCL-20.4

- 35 • The inclusion of references to d in the header to column 2 of the table is technically incorrect. The verification
 36 scale division must refer only to e.
- 37 • The change to Note 1 serves to eliminate the confusion about considering e to be the digit to the left of d, and
 38 ensures the e value comes from the markings on the device. It is the manufacturer who chooses e for
 39 classification purposes.
- 40 • The changes to note 3 correctly references the verification scale division e and not the scale division d, and
 41 they clean up some grammatical errors.

42 SCL-20.5

43 The change clarifies that the verification scale division is equal to the marked d when no separate marking of e is
 44 provided. Note that nothing in Note 3 prevents marking $d = 1g$ $e = 1g$, or capacity $10000g \times 1g$ $e = 1g$. The change
 45 to the last sentence cleans up a nonsensical term “weight unit.” The scale division must be in a unit of weight, e.g., g,

1 kg, lb, etc. The intent was to have each range of a multi-range device include a capacity and division size n . Note R76
 2 requires marking of Class, Max (capacity), and e , with a marking of d is only required when $e < d$.

3 SCL-20.6

4 The change to T.N.1.1.2. corrects the contradiction between the current code using d and the definition using e in
 5 determining accuracy class. The value of n in the definitions already correctly refers to e .

6 The change to T.N.1.1.3. is an attempt to clarify (e) and (d) similar to R 76 in Table 2. Note that when $e=d$, under
 7 S.6.3. only one marking is required. It is only when $e \neq d$ that S.6.3. requires both to be marked. The addition of
 8 material for ungraduated analog devices is housekeeping since d has no meaning for these devices. The change also
 9 clarifies that some requirements are directed to d (functional requirements on the device) and some to e (relating to
 10 classification and tolerance values).

11 **3. Discuss issues of suitability of scales when e and d are not equal.**

12 SCL-20.7

13 It is the value of e that is used in specifying tolerances according to the definition of e , and all values in this table must
 14 be expressed in terms of e . The table is currently written in terms of the scale division d , which is technically incorrect.

15 SCL-20.8

16 The parenthetical (d or e) in the headers to columns 2 and 3 is confusing when the two are not equal. Which one do
 17 you use? The note may address Class I and II devices, but it does not help with weight classifiers in Classes III and
 18 IIII, where you certainly don't want to use d .

19 It is vital to note that for instruments under R76 the manufacturer is required to mark a minimum load (Min). The
 20 manufacturer calculates Min using e . However, the minimum load is marked in mass units matching the instrument
 21 display in divisions of d . There is no confusion since it is marked on the instrument. In HB44 the inspector must
 22 determine the minimum load from Table 8 and the scale markings. Most users don't even know this requirement
 23 exists, unless told by the inspector.

24 Table 8 is addressing the large significance of rounding error at small loads. The
 25 table must be clear to ensure the correct scale division is used in enforcement. The
 26 table at right shows the relative errors resulting from roundoff to the nearest scale
 27 division d at various loads in the table. In principle, we are trying to ensure loads
 28 weighed are sufficient to reduce the relative errors to the levels shown, i.e. for
 29 Class I – 0.5%, for Class II – 1.0%, Class IIII – 1.0%, for Class III – 2.5%, and
 30 Class IIII – 5%. While these might seem large initially, there is a diminishing
 31 returns effect. A small percentage of a small number tends to be insignificant.

Load d	Relative Error
10	5.0%
20	2.5%
50	1.0%
100	0.5%

32 Because the value of commodities goes up as the accuracy goes up, we have more stringent requirements on Classes
 33 I and II.

34 Scales fall into three categories, i.e. with $e > d$, $e = d$, and $e < d$.

35 • If $e < d$, e.g. weight classifiers, it seems clear the appropriate choice is e . The table in the second note specifies
 36 d , which is technically incorrect. For example, a Class III weight classifier with $d = 50$ $e = 1$ g, the relative
 37 accuracy of 5% is reached at 10 e . At 10 d or (500 e) the relative error due to rounding is 0.1%.

38 • If $e = d$, it doesn't matter.

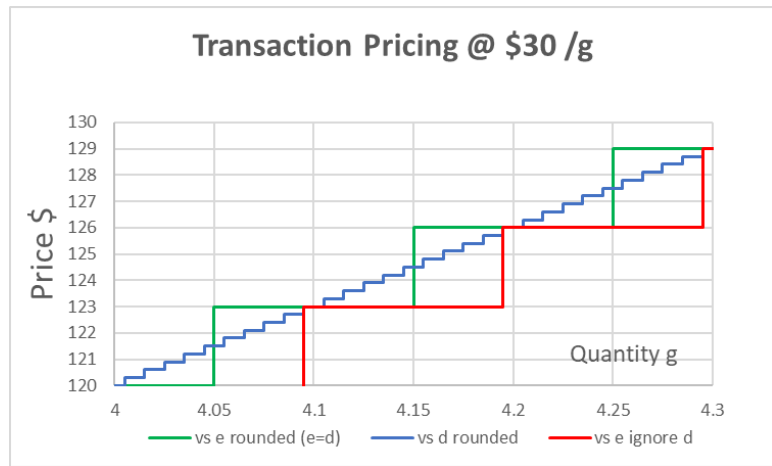
39 • If $e > d$, on some Class I and II scales, you get the desired relative error when you use d . If you use e , the
 40 scale with $e \neq d$ will result in much smaller rounding error since the rounding is internally applied to d and
 41 not to e . Examples: If $e = 0.1$ g, then 50 e is 5 g and the rounding error is $0.5 e / 50 e = 1\%$, i.e. the desired
 42 level for Class II. If $e = 0.1$ g and $d = 0.01$ g, then 50 e is 5 g and the rounding is to $0.5 d$ or $0.05 e$, thus the
 43 rounding error is $0.05 e / 50 e = 0.1\%$. This may be why the parenthetical (d or e) is used in the current

1 language. Perhaps it was intended that we use the smaller value of the two if e and d are different. The
 2 proposal states e is used in cases where $e < d$ and d is used in all other cases. This eliminates any confusion.
 3 We may consider adding a marking of Min as per R76 as a future idea.

4 The change to the * note performs a similar function to the change in Note 1 in Table 3, as it disconnects e from
 5 d and relies solely on the markings of d and e.

6 In 2017, the NCWM added S.1.2.2.2. to prohibit use of Class I and II scales with a differentiated scale division. One
 7 argument was that the differentiated digit would cause confusion. There were arguments in opposition to the proposal.
 8 I argued that the confusion rested mostly with the weights and measures community (see earlier discussion). Plus, the
 9 finer digit extended the usable range of the scale since you could reach the 1% limit to rounding error at 50 d. For a
 10 Class II scale with $e = 0.1$ g and $d = 0.01$ g, that means weighing small loads down to 0.5 g loads which is something
 11 that users need in the cannabis trade.

12 One issue involves the rounding errors
 13 addressed in Table 8. A more critical issue
 14 in my view is the pricing increments. At
 15 \$30/g, 0.1 g e represents a pricing
 16 increment of \$3. By displaying 0.01 g d,
 17 that 0.01 g d reduces the price increment to
 18 \$0.30. This is displayed in the graph at
 19 right. The blue line shows the 30 cent steps
 20 if you use the differentiated d. If you use
 21 the digit to the left of the differentiated d,
 22 you see the counted divisions e discussed
 23 earlier. The gap between the blue and red
 24 lines show the losses to users if they are
 25 forced to round down. The green line
 26 shows pricing on a normally rounded scale
 27 with 0.1 g e. The normal rounding shares
 28 the risk equally between buyer and seller.



29 If the user must have a scale with $e = d$, then it forces them to go to 0.01 g e to service loads at the 1 g level. For that
 30 scale 50 e is 0.5 g, and the 1 g loads weighed are near 100 e. Precision scales rarely use 2 or 5 divisions, so capacities
 31 get reduced by a factor of 10 to move down to the next smaller division size. Blocking the use of $e=10d$ may force
 32 many users to purchase two scales where a single scale would have been suitable if using a scale with a differentiated
 33 d were not blocked.

34 **4. Discussion regarding disconnecting e from d**

35 Sections in the current Scales Code are being incorrectly interpreted to imply there is a direct connection between e
 36 and d. Essentially there is a belief when inspecting Class II scales when e does not equal d that we are somehow
 37 verifying the first digit to the left of d. Even when $e = d$, there is a belief that we are verifying d. That fails to follow
 38 the principles incorporated in G-T.3. We are not verifying the division; we are verifying the entire instrument
 39 indication at an applied load.

40 The scale division d is defined as the smallest division of the instrument under test (IUT). The scale division is referred
 41 to extensively in the code and we find that requirements written around d regulate the operating characteristics of the
 42 instrument, e.g. discrimination. When reading analog indications, we round to the nearest graduation (See Appendix
 43 A. Section 10). Under General Code G-S.5.2.2. (d), there is an important requirement that the smallest division of any
 44 digital device round off. Unless specifically designated the instruments in HB44 are in “normal rounding” class of
 45 instruments. Even with normal rounding, it is critical to understand that the digits to the left of the least significant
 46 digits are not rounded. They are counted. For example, as you count the rounded-off d's, when you increment from 9
 47 to 0 in the least significant digit, the next digit increments 1 digit. The break point between digits to left of the least
 48 significant digit always occurs at 9.5 d. If d is 1 g, then the tenth d is counted as 10 g and the 100th d is counted as 100
 49 g, etc. Normal rounding of the tens place would normally occur at 5.0 d. If you attempt to apply tolerances to e and

1 just ignore d, you are not rounding in conformance to G-S.5.2.2. (d). Instead, you are rounding down, which places
 2 the scale user at a disadvantage and disrupts equity.

3 UR.3.10. addresses dynamic monorail scales, which also have e
 4 \neq d, and requires that the commercial transaction using these
 5 devices shall be based on e, interpreted to mean the digit to the
 6 left of the differentiated d. These transactions therefore must be
 7 based on a counting scale (rounding down) instead of a half-
 8 up/half-down system as required in G-S.5.2.2. (d). When applied
 9 to a high-priced commodity at \$30 /g, the pricing errors add up
 10 because the scale user is forced to always round down. The table
 11 at right shows the impact, and this impact can be attributed to
 12 every transaction. At \$30/g, the average loss to the user per
 13 transaction is \$1.35. That is not equity!

Indication	\$ Using d	\$ Using e	\$ gain/loss
0.95	\$28.50	\$27.00	-\$1.50
0.96	\$28.80	\$27.00	-\$1.80
0.97	\$29.10	\$27.00	-\$2.10
0.98	\$29.40	\$27.00	-\$2.40
0.99	\$29.70	\$27.00	-\$2.70
1.00	\$30.00	\$30.00	\$0.00
1.01	\$30.30	\$30.00	-\$0.30
1.02	\$30.60	\$30.00	-\$0.60
1.03	\$30.90	\$30.00	-\$0.90
1.04	\$31.20	\$30.00	-\$1.20
1.05	\$31.50	\$30.00	-\$1.50

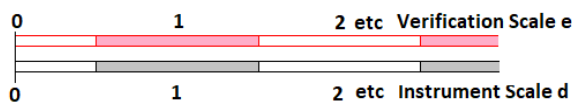
14 Verifying a scale division is virtually impossible. For a Class II
 15 device the accuracy requirement is approximately 0.01% of
 16 applied load. If the division is 0.1 g, then the required accuracy
 17 is ± 0.00001 g and we are trying to measure that with a resolution
 18 of 0.1 g. In addition, we don't have standards below 1 mg.

19 I contend that e is not the digit to the left of the differentiated d! Nor do we verify e. Careful reading of the definition
 20 of the verification scale division “e” in Appendix D will reveal no direct connection between e and the indications on
 21 the instrument being verified. The verification scale division is a mass (weight) value declared by the manufacturer in
 22 required markings that is used in classifying instruments and in specifying tolerances for the device. In the header to
 23 column 2 in Table 3., we find the expression “Verification Scale Divisions (d or e¹). This is another chance to
 24 misunderstand the Code. The verification scale division must be e according to the definition. It can't be d, although
 25 it can have the same value as d. Similarly, reading Note 1 in Table 3, you might conclude that e is the value of the
 26 digit immediately to the left of d. The critical distinction is that e is a value of that digit and not the actual division of
 27 the display. To avoid confusion, I propose amending Table 3. to simply direct you to the scale markings to find e and
 28 remove any reference to the digit in the display.

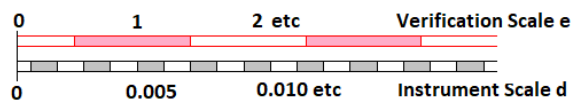
29 The e value is also used in classifying instruments in the Scales Code. Classes refer to relative error ranges. This comes
 30 from the ratio MTol / e. At the second step in the tolerance structure in Table 6. Under HB44 a Class III instrument is
 31 $\sim 0.1\%$ accurate. This is 2 e tolerance for a load of 2,000 e. A Class II instrument is accurate to $\sim 0.01\%$, or 2 e error
 32 for a load of 20,000 e. However, the tolerances within a class are stepped, such that the % error varies through the
 33 operating range. For Class II the relative errors are 0.02% at 5,000 e, 0.01% at 20,000 e and 0.0033% at 100,000 e.
 34 The manufacturer decides what class and relative accuracy he needs to serve (based on capacity and n) and designs
 35 accordingly.

36 If e is not a division on the instrument, what is it? In R76, the basis of our current Scales Code, the term “scale” is not
 37 used to refer to a weighing instrument, but rather the graduations or divisions, i.e., the “scale” of indication. Thus, a
 38 scale division is not limited to weighing devices. A register on an LMD has a “scale division,” e.g., a RMFD typically
 39 indicates in 0.001 gal divisions of scale. It should be easy to see the 0.001 gal increments correspond to d in the Scales
 40 Code. When we verify the RMFD, we use a test measure with an independent scale, either 1 in³ for older measures
 41 and 0.5 in³ for newer measures. The “verification scale” for the RMFD is therefore the “scale” on the test measure
 42 used to determine the true value. The instrument scale and the verification scale connect at only one point, at ZERO!
 43 Error arises when the two scale diverge as you move along the measurement scale due to linearity errors, influence
 44 factors, random variations, etc., within the instrument. The Verification Scale is considered to have no error.

Classification when e=d



Classification when e = 1 in³ d = 0.001 gal

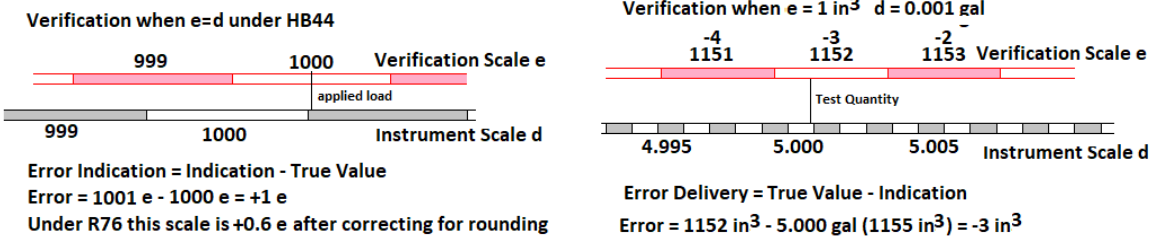


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1 Above at left, the graphic shows a case where $e = d$. Notice how the divisions d and e both begin at center zero and
 2 the divisions align perfectly because at this magnification it is impossible to see small differences. The test evaluates
 3 the sum of many divisions in order to see any deviation. Above at right, the graphic shows how the $1 \text{ in}^3 e$ for the
 4 RMFD verification aligns with the $0.001 \text{ gal } d$ of the instrument. Now imagine what happens when a test is performed.

5 Classification is based on relative error. This allows the verification scale division to differ from the instrument scale
 6 division, sometimes larger and sometimes smaller. With the RMFD above right, d is significantly smaller than e . In
 7 fact, the $6 e$ maintenance tolerance is $25 d$. The two scales are independent. Would anyone suggest that the d smaller
 8 than e is inappropriate for commercial use. We verify the RMFD to e just like the weighing instrument with $e = 10 d$.
 9 The confusion comes from the requirement to differentiate d on these instruments.

10 Why does the Code require d to be differentiated when d is smaller than e ? That is the critical question. It is not
 11 because d is somehow inaccurate or unreliable. It is not because d is smaller than the e of the tolerances. I believe it
 12 is because the code wanted to ensure that the serviceperson or official did not use d for tolerance calculations. It had
 13 nothing to do with users or customers.



14 In the above graphics, the instrument scale diverges from the verification scale. They both started at the same zero
 15 reference. Notice that the RMFD at right calculates delivery error vs indication error at left. The key is to understand
 16 that the verification scale has no error and we are measuring the deviation of the instrument scale from the verification
 17 scale.
 18

19 This pattern holds true for other verification tests, from tests of packaged goods with a reference scale to tests of
 20 taximeters on a road course. Circling back to the proposed definition of true value, in addition to its use in classifying
 21 scales, **the verification scale is that “scale” used to measure the true value. The division of that “true value”**
 22 **measurement scale is “e.”** With the new G-T.3. that true value is the legal basis of our tests and is known without
 23 uncertainty. A table of a variety of verifications and their d and e scales are provided below.

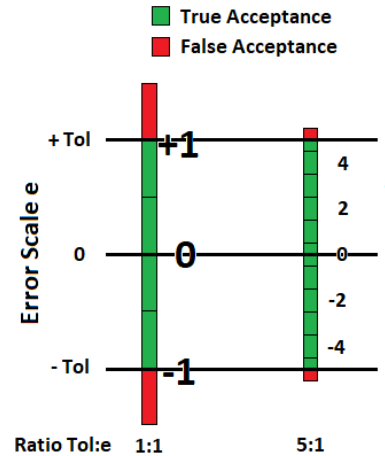
Instrument & quantity	Instrument scale division d	Verification scale division e	Maintenance Tolerance	Ratio MT/ e
RMFD @ 5 gal	0.001 gal	1 in^3 0.5 in^3	6 in^3	6 12
VTM @ 100 gal	0.1 gal	5 in^3	$\sim 70 \text{ in}^3$	14
Rack @ 1,000gal	1 gal	0.1 gal	3 gal	30
Mass Flow Class 0.3	$\leq 0.2\% \text{ MMQ}$	$\leq 0.02\%$	0.3%	15
Taximeter @ 1 mi	0.2 mi	$\sim 0.001 \text{ mi}$ (!5 ft)	$+0.01/-0.04 \text{ mi}$	10/40
Package Checking @ 1 lb @ 4 oz	N/A N/A	$\leq 0.005 \text{ lb}$ $\leq 0.002 \text{ lb}$	0.044 lb 0.016 lb	8.8 8
III scale $e = d$ @ 200 d	1 d	1 e = 1 d	2 e	2
III scale $e = d$ @ 2,000 d	1 d	1 e = 1 d	2 e	2
II scale $e = d$ @ 20,000 d	1 d	1 e = 1 d	2 e	2
II scale $e = 10 d$ @ 20,000 e	1 d	1 e = 10 d	2 e	2

1 The last column of the table is the real focus of verification. We want to have
 2 sufficient resolution in determining errors. Although the issue is a bit more
 3 complicated, this ratio is a measure of the effectiveness of the verification.
 4 Special notes:

5 • For the RMFD, VTM, and Rack instruments the ratio is limited by
 6 HB105-3 and the specified minimum division of the prover scale. This
 7 becomes part of the code when you specify the prover must meet that
 8 specification.

9 • For the mass flow instruments the Notes provide no guidance on the
 10 verification scale division. I submit the value of resolution in error
 11 should be in HB44 Notes for all Codes, similar to R76 for weighing
 12 instruments. This is something I hope the work group on alternative
 13 test methods addresses. The EPO does specify the reference scale
 14 division be no larger than 1/10 of the smallest tolerance applied. This
 15 means the Mass Flow code requires a minimum ratio of 15:1 for maintenance tolerance which I believe is
 16 overkill and very costly. Compare to 5:1 elsewhere.

17 • For scales the ratio is only 2:1 as currently written in Handbook 44. There is no mention of error weights in
 18 the Code. In R76, the ratio is specified in that it requires errors to be determined to at least 0.2 e. This produces
 19 a ratio of 5:1 in the first step, 10:1 in step two and 15:1 in step three. If you determine errors to 0.1 e, as we
 20 do normally with error weights, it allows you to double those ratios and provide 10:1 in the first step. Reading
 21 the errors in d when $e = 5d$ or $e = 10d$, allows you to meet the minimum without using error weights (or
 22 expanded resolution).



23 Why use maintenance tolerance in computing this ratio? In verification, there is a shift in emphasis relative to
 24 calibration. In verification, your primary concern is with the population. You want all the devices in the same
 25 commercial field to have performance that is similar enough to promote equity. Even if you are little sloppy in applying
 26 acceptance tolerance, the instrument is highly likely to perform within maintenance tolerances. In calibration, the
 27 focus is always on a single artifact or instrument.

28 Why is this resolution in determining errors important? The short answer is to reduce the incidence of false
 29 acceptance/rejection. The Range of False Acceptance (RFA) can be defined as the portion of the compliant measured
 30 error that reaches outside the tolerance limits due to rounding in the error calculation. Limiting the RFA is the objective
 31 in specifying the resolution of errors.

32 When we use direct reading in testing weighing instruments the ratio of Tol:e in the first tolerance step is 1:1 and we
 33 have an RFA of $\frac{1}{2} e$ in proportion to the 1 e tolerance. The RFA is 50% of the tolerance, meaning we can accept
 34 instruments in error up to 1.5 times the tolerance. When we add the R76 requirement to measure errors to 0.2 e we
 35 increase the ratio of Tol:e to 5:1 and thereby reduce the RFA to 0.1 e in proportion to the 1 e maintenance tolerance
 36 (see graphic at right). This RFA is only 10% of the tolerance. Statistically, it can be shown that the RFA contributes
 37 to the population variability based on the Root Sum Square. At $\frac{1}{2} e$ RFA when Tol:e is 1:1, the population variability
 38 gets increased by 22%. When we increase the Tol:e ratio to 5:1 the population variation is only increased by 1%,
 39 which is not considered significant.

40 A better way to express this in is terms of compliance rate. Imagine your test data shows compliance of a class of
 41 devices as 95% at 1 e tolerance, but you are testing using direct reading. Due to rounding in measuring the error that
 42 you are not addressing, 95 % of the instruments are actually within 1.22 e and not the 1.00 e indicated in the compliance
 43 data. By increasing the Tol:e ratio to 5:1, 95% of the instruments are accurate within 1.01 e.

44 2020 NCWM Interim Meeting: The Committee acknowledged written comments from the submitter and heard
 45 comments during the open hearing session on this item. Mr. Constantine Cotsoradis (Flint Hills Resources) and Mr.
 46 Russ Vires (SMA) representing interests from an industry perspective questioned the need for the changes being
 47 proposed in this block of items. Additional comments from regulatory officials indicated that the changes included in

1 this proposal were not successful in clarifying HB44 requirements and possibly added to any confusion that exists.
 2 Mr. Steve Cook (CA, retired) pointed out that the changes ignored weighing devices that did not fall under Accuracy
 3 Class I or II and stated his willingness to work with the submitter to further develop the proposal.

4 Several other comments heard during open hearings indicated that it is questionable to include all of the individual
 5 items that are shown as part of Block 2. Comments from SMA, and some regulatory officials recommended that this
 6 Block of items be separated since not all items now grouped under Block 2 seem to be closely related. Mr. Kurt Floren
 7 (Los Angeles Co., CA) also pointed out that some of the proposed amended language is not clear and will add to
 8 confusion in interpretation of requirements and that there are some editorial corrections and proper formatting needed
 9 in this proposal as well.

10 NIST OWM commented that while most of the proposed changes seem to be fundamentally sound, the urgent need
 11 to implement some of those proposed changes is not clear. OWM also agreed with other comments that recommend
 12 separating the items under Block 2 into individual items or grouped together where items are more clearly related.
 13 OWM notes that item SCL-20.2 now included in Block 2 is clearly related to two other items individually listed on
 14 the S&T Committee’s agenda: SCL-20.10 and SCL-20.11. Additionally, OWM believes that the determination if
 15 individual Scales Code requirements are meant to apply to either “e” or “d” should be carefully considered on a case-
 16 by-case basis. Also recommended was that additional input be solicited from stakeholders (industry officials and
 17 device manufacturers in particular) prior to adopting any changes based on this proposal.

18 During the Committee’s work session, they agreed that some of the items combined under Block 2 should be separated.
 19 The Committee agreed that items GEN-20.1, SCL-20.1, and SCL-20.2 should be removed from Block 2 and given
 20 individual consideration. Considering items individually, the Committee agreed to the following:

- 21 • Item GEN-20.1: The Committee acknowledged the receipt of comments from some of the regional
 22 associations concerning the use of the term “True Value” in the formulas included in parts (a) & (b) and how
 23 it is defined in the proposal. The Committee agreed that there may be value in further defining the application
 24 of tolerance and that the item should be given a Developing status adding that consideration should be given
 25 to amending the use of the term “True Value.”
- 26 • Item SCL-20.1: There were no direct comments regarding this item during open hearings. The Committee
 27 reviewed NIST OWM’s analysis on this item and agreed it should be withdrawn noting this proposed change
 28 is unnecessary.
- 29 • Item SCL-20.2: During open hearings this item was discussed relative to items SCL-20.10 and SCL-20.11
 30 which address the same issue. Most comments received were in favor of option 2 in this proposal which was
 31 effectively the same as SCL-20.10. The Committee agreed this item should also be withdrawn.
- 32 • Items SCL-20.3: The Committee agreed items SCL-20.4, SCL-20.5, SCL-20.6, SCL-20.7, and SCL-20.8
 33 should be grouped together as Block 2 and given an Assigned status.

34 NCWM 2020 Annual Meeting: Due to the 2020 Covid-19 pandemic, this meeting was adjourned to January 2021, at
 35 which time it was held as a virtual meeting. Due to constraint of time, only those items designated as 2020 Voting
 36 Items were addressed. All other items were addressed in the subsequent 2021 NCWM Interim Meeting.

37 NCWM 2021 Interim Meeting: The Committee heard comments on this item during the open hearing session
 38 including the following.

39 Mr. John Barton (NIST OWM) stated that as a member of the Task Group assigned to this item, that group met on
 40 several occasions over the past 4 months to deliberate on the issues involved in this proposal. While the Task Group
 41 came to conclusions that are included in the final report, there had been other individuals and groups that came to
 42 different conclusions on those issues. Those other individuals and groups included subject matter experts, NTEP
 43 evaluators, scale manufacturers, and the NTEP Weighing Sector. Mr. Barton further stated that given the impact of
 44 changes proposed in this item, it may be wise to include additional sources of input prior to adopting the recommended
 45 changes.

1 It was also noted that the Committee set a date of November 15, 2023 for the Task Group to return its conclusions and
2 that the Task Group finalized its work in a matter of 4 months rather than using the 3 years granted. It is also significant
3 to note that the Task Group requested an Informational status for this item as opposed to a Voting status. This suggests
4 that the Task Group is open to the notion that the proposal could be vetted further even when they have generated a
5 “final” report on their work.

6 Mr. Henry Opperman (Weights and Measures Consulting) referred to the written comments he submitted to the
7 Committee prior to this meeting and stated that all individual items in this Block should be withdrawn. Mr. Opperman
8 stated that the proposals in this Block are based on false premises and therefore should not be adopted. Mr. Alan
9 Walker (FL) agreed with Mr. Opperman and stated this proposal should be withdrawn also.

10 During the committee’s work session, the Committee considered updating the charge to the TG to direct that group to
11 specifically identify each change recommended in the final report to actual changes proposed as amendments in HB
12 44. The Committee also recommends this remains as an assigned item.

13 NCWM 2021 Annual Meeting: At the request of the Task Group Chair, the Committee elevated the status of this item
14 from Assigned to the task group to Informational.

15 NCWM 2022 Interim Meeting: Rick Harshman (NIST) recommended that the Task Group provide the committee
16 with its recommendations in the form of an updated item under consideration. NIST also provided the committee with
17 written comments. Doug Musik (Task Group Chair) spoke to the changes the task group had made that were in
18 Appendix A of the publication and recommended sending it back to the Task Group. Russ Vires (SMA) supports the
19 development of the item and recommended the following changes;

20 SCL-20.4: Table 3, footnote 1: note to discuss e not equal to d
21 SCL-20.6: “d” in parathesis () should be struck out
22 SCL-20.7: table 6 added SCL-20.8: scales may have verification internal e not equal to scale division “D”

23 Matt Douglas (California, Division of Measurement Standards) recommended accepting the changes from SMA.
24 Charlie Stutsman (KS) recommended sending the item back to the Task Group.

25 The Committee agreed the item should be assigned back to the Task Group and that the item be refined and submitted
26 to the conference.

27 **Regional Associations’ Comments:**

28 WWMA 2021 Annual Meeting: Matt Douglas (California - DMS): the language is not clear, recommend that this
29 item be withdrawn. (the whole block). Russell Vires (Scale Manufacturers Association): this is a carryover item. SMA
30 supports further development of this item, recommend that the SMA encourage the use of term: Verification Scale
31 Interval for (e) and Scale Division for (d). (he can send info.) States that his comments are the same from the Annual
32 meeting. Diane Lee (NIST OWM): NIST OWM comments on this item are posted on NCWM website
33

34 The WWMA S&T Committee recommends that this item remain informational with concern given to the comments
35 given during the WWMA open hearings. During the Committee work session, clarification was given regarding
36 Committee member Matt Douglas’ (California - DMS) testimony questioned whether or not the item provides
37 assistance to an Inspector in the field in the performance of their job.

38 SWMA 2021 Annual Meeting: Russ Vires, SMA, supports further development of this item, and recommended the
39 descriptive name changes for “e” and “d” as posted on the NCWM website.
40

41 This committee recommends this item move forward with an Assigned status.

42 CWMA 2021 Interim Meeting: Lou Straub-SMA supports item. Would like to see it written that “scale division”
43 will have value of “d” and “verification scale interval” for “e”.
44

45 CWMA S&T Committee recommends that item be assigned back to the Verification Scale Division Task Group.

1 NEWMA 2021 Interim Meeting: Rick Harshman (NIST OWM) recommends keeping this item in informational status
 2 due to the fact that the National S&T Committee has taken ownership and interpretations have been provided at NTEP
 3 and weighing sector meetings. Meeting notes are available on NCWM website. Henry Opperman (Weights and
 4 Measures Consulting) objected to many of the blocked items and recommend to keep this item in informational status.
 5 Lou Staub (SMA) suggested the use of the term “verification scale interval” for “e” and “scale division” for “d”. John
 6 McGuire (New Jersey)- Recommends keeping the item in informational status.

7 The NEWMA Specifications and Tolerances Committee recommends that this item be kept in Informational Status.

CWMA Report: B2: SCL-20.8
<p>Regional recommendation to NCWM on item status:</p> <p> <input type="checkbox"/> Recommend as a Voting Item on the NCWM agenda <input type="checkbox"/> Recommend as an Information Item on the NCWM agenda <input checked="" type="checkbox"/> Recommend as an Assigned Item on the NCWM agenda <i>(To be developed by an NCWM Task Group or Subcommittee)</i> <input type="checkbox"/> Recommend as a Developing Item on the NCWM agenda <i>(To be developed by source of the proposal)</i> <input type="checkbox"/> Recommend Withdrawal of the Item from the NCWM agenda <i>(In the case of new proposals, do not forward this item to NCWM)</i> <input type="checkbox"/> No recommendation from the region to NCWM <i>(If this is a new proposal, it will not be forwarded to the national committee by this region)</i> </p>
<p>Comments and justification for the regional recommendation to NCWM: <i>(This will appear in NCWM reports)</i></p> <p>Russ Vires – SMA - The SMA recommends striking the following language from the submitter’s proposal: <u>Seales manufacturers are permitted to design scales where the value a verification scale division e differs from the displayed scale division d.</u> When taken with the SMA’s recommendation for SCL-20.4, this will avoid duplication in the HB44 code.</p>

8 Additional letters, presentation and data may have been submitted for consideration with this item. Please refer to
 9 <https://www.ncwm.com/publication-16> to review these documents.

10 **BLOCK 3 ITEMS (B3) TOLERANCES FOR DISTANCE TESTING IN TAXIMETERS**
 11 **AND TRANSPORTATION NETWORK SYSTEMS**

12 **Source:**
 13 New York Department of Agriculture and Markets

14 **Purpose:**
 15 Provide the same distance-measurement tolerances for the Taximeters Code and Transportation Network Systems
 16 Code.

17 **B3: TXI-20.1 D T. Tolerances**

18 **Item Under Consideration:**
 19 Amend Handbook 44, Taximeters Code as follows:

20 **T. Tolerances**

21 **T.1. Tolerance Values.**

1 **T.1.1. On Distance Tests.** – Maintenance and acceptance tolerances for taximeters shall be as follows:

- 2 (a) On Overregistration: 1 % of the interval under test **when the distance is 1.6 km (1 mile) or less.**
3 **2.5 % of the interval under test when the distance is greater than 1.6 km (1 mile).**

CWMA Report: B3: TXI-20.1	
Regional recommendation to NCWM on item status:	
<input checked="" type="checkbox"/> Recommend as a Voting Item on the NCWM agenda <input type="checkbox"/> Recommend as an Information Item on the NCWM agenda <input type="checkbox"/> Recommend as an Assigned Item on the NCWM agenda <i>(To be developed by an NCWM Task Group or Subcommittee)</i> <input type="checkbox"/> Recommend as a Developing Item on the NCWM agenda <i>(To be developed by source of the proposal)</i> <input type="checkbox"/> Recommend Withdrawal of the Item from the NCWM agenda <i>(In the case of new proposals, do not forward this item to NCWM)</i> <input type="checkbox"/> No recommendation from the region to NCWM <i>(If this is a new proposal, it will not be forwarded to the national committee by this region)</i>	
Comments and justification for the regional recommendation to NCWM: (This will appear in NCWM reports)	
Charlie Stutesman – KS – Interested to know why the tolerance isn't consistent with underregistration and overregistration. The submitter of this item provided an updated proposal on March 23, 2022, which is posted on the NCWM website. This update clarified the tolerances for TXI-20.1 and recommended withdrawal of TNS-20.1. The CWMA S&T Committee recommends withdrawal of TNS-20.1 per the submitter's request. The Committee recommends that TXI-20.1 proceed to voting status as presented in the March 23, 2022, updated proposal:	
T.1. Tolerance Values.	
T.1.1. On Distance Tests. – Maintenance and acceptance tolerances for taximeters shall be as follows:	
<u>T.1.1.1 Meters Using Distance generated from sources physically connected to the vehicle (e.g OBD sensor).</u>	
(a) On Overregistration: 1 % of the interval under test. (b) On Underregistration: 4 % of the interval under test, with an added tolerance of 30 m or 100 ft whenever the initial interval is included in the interval under test.	
<u>T.1.1.2 Meters Using Distance generated from sources not physically connected to the vehicle (e.g navigation satellite system such as GPS and /or other location services).</u>	
(a) On Overregistration: 2.5 % (b) On Underregistration: 2.5 %	

1 **B3: TNS-20.1 D T. Tolerances**

2 **Item Under Consideration:**

3 Amend Handbook 44, Transportation Network Systems Code as follows:

4 **T. Tolerances**

5 **T.1.1. Distance Tests.** – Maintenance and acceptance tolerances shall be as follows:

6 (a) On Overregistration: ~~2.5%~~ **1 % of the interval under test when the distance is 1.6 km (1 mile)**
 7 **or less. 2.5 % of the interval under test when the distance is greater than 1.6 km (1 mile).**

8 (b) On Underregistration: ~~2.5 %~~ **4 % of the interval under test.**

9 **Background/Discussion:**

10 This item has been assigned to the submitter for further development. For more information or to provide comment,
 11 please contact:

12 Mr. Jim Willis
 13 New York Department of Agriculture and Markets
 14 518-485-8377, james.willis@agriculture.ny.gov

15 Taximeter manufacturers are submitting devices identical to the devices in the Transportation Network Measurement
 16 Systems code; however, they are faced with a tighter tolerance for over-registration. Both devices are typically
 17 computer pads or cell phones. Taximeter companies want to take advantage of some of the same technology used by
 18 TNMS companies, however, the tolerance for taximeters is much tighter than the tolerance for TNMS meters. During
 19 type evaluation, it is common to drive more than 1 mile to incorporate tunnels and valley effect. If the same tolerance
 20 was applied, taximeters would have the same chance of passing as TNMS meters.

21 Some jurisdictions that test taximeters may not want the tolerance for a 1-mile course to be raised given the good
 22 history of their test programs. This is the reason I am proposing maintaining the 1% tolerance at 1 mile or less.

23 Some TNMS companies may be concerned that their device will not pass a 1% tolerance, but we believe that on a
 24 straight, 1-mile course, devices operating properly should have no problem passing.

25 NCWM 2020 Interim Meeting: The Committee heard from NIST OWM explaining that the proposal is not technically
 26 correct by inserting language that refers to “intervals” in the tentative HB 44 TNMS Code. These types of systems
 27 do not calculate a charge for fare using intervals (i.e., segments) of the total travel in a trip as do taximeters. TNMS
 28 calculate fare charges based on the entire distance/time in a trip. Additionally, these two different systems (taximeters
 29 and TNMS) are becoming more similar and the differences that were used to distinguish them from one another are
 30 beginning to fade. OWM noted there is a need for the USNWG on Taximeters that developed the tentative TNMS
 31 Code to meet and discuss the potential of a merger of these two HB 44 Codes. Mr. Kurt Floren (Los Angeles Co.,
 32 CA) pointed out that taximeters have been and still are meeting existing tolerances and therefore he questions the need
 33 to expand those tolerance values.

34 Mr. Stan Toy (Santa Clara Co., CA) expressed his belief that the tolerances for taximeters do not need to be expanded
 35 and that this item should be Withdrawn. Mr. Jim Willis (NY) pointed out that New York Weights and Measures has
 36 issued its own type approval for taximeters that use location services such as GPS to measure distance. Mr. Willis
 37 stated further that NY would support a Developing or Assigned status.

38 During the Committee’s work session, it was agreed to assign a Developing status with the understanding the USNWG
 39 on Taximeters has offered to assist the submitter in further development of the proposal.

1 NCWM 2020 Annual Meeting: Due to the 2020 Covid-19 pandemic, this meeting was adjourned to January 2021, at
2 which time it was held as a virtual meeting. Due to constraint of time, only those items designated as 2020 Voting
3 Items were addressed. All other items were addressed in the subsequent 2021 NCWM Interim Meeting.

4 NCWM 2021 Interim Meeting: Mr. John Barton (NIST OWM) stated that OWM noted issues of concern in this proposal
5 during the 2020 NCWM Interim Meeting regarding how tolerances are applied to taximeters in contrast to how they are
6 applied to TNMS. This proposal does not seem to recognize these differences. OWM also notes the many opposing
7 comments made pertaining to the increase of tolerances for taximeters which have complied with existing tolerances for
8 decades. The NIST USNWG on Taximeters has been conducting meetings with a goal of merging the HB 44 Taximeters
9 and TNMS Codes. This work will include a number of modifications to both codes that will affect the specifications, test
10 procedures, user requirements, and possibly the tolerances. The USNWG has offered to work with the submitter of this
11 proposal.

12 Mr. Willis representing the submitter of this item stated a willingness to work the USNWG on Taximeters.

13 During the committee's work session, the members noted the submitter's willingness to work with the taximeter work
14 group and agreed to maintain this item's Developing status.

15 **Comments in Favor:**

16 **Regulatory:**

- 17 • A regulator from New York presented current edits of the proposal at the time of his comments. These
18 edits were not published in Publication 15 and when presented during open hearings, membership was
19 unable to view the content due to the projected size on the screen and on online screens. The
20 commenter stated that many taxis operate with a GPS based systems and are still categorized as a taxi
21 meter due to the nature of their business and this would provide the same tolerances for similar
22 technology. Recommends revised version move forward as Voting status.

23 **Industry:**

- 24 • No Comments

25 **Advisory:**

- 26 • No Comments

27
28 **Comments Against:**

29
30 **Regulatory:**

- 31 • A regulator from Los Angeles County, CA commented this may set a dangerous precedence and noted
32 the same requirements should apply to similar devices, regardless of design or technology used.
33 Recommends withdraw.
34 • A regulator from California DMS commented there is no justification for increasing the tolerances for
35 equipment already meeting the requirements. Recommends withdraw.

36 **Industry:**

- 37 • No Comments

38 **Advisory:**

- 39 • An advisory member representing NIST OWM commented on the expansion of tolerances and noted
40 that taximeters have a long-standing history showing these devices can meet these established
41 tolerances. The commenter recommends the submitter work on the proposal and engage in efforts to
42 merge the taximeter and TNMS codes with the USNWG. It was also stated the USNWG has this item
43 on their agenda for further discussion. Recommends the proposal be further developed with the
44 assistance of the USNWG.

45 **Neutral Comments:**

46 **Regulatory:**

- 47 • No Comments

48 **Industry:**

- 1 • No Comments
- 2 **Advisory:**
- 3 • No Comments

4

5 **Item Development:**

6 NCWM 2022 Interim Meeting: The Committee assigned a developing status for this item at the 2022 Interim Meeting.
 7 The committee recommends the submitter work with the USNWG on this proposal. As noted in open hearings this is
 8 an item on the USNWG agenda and there may be efforts on the way to address this issue by other means.

9 **Regional Associations’ Comments:**

10 WWMA 2021 Annual Meeting: Kurt Floren (LA County): This coincides with previous comments: new tech with
 11 GPS tracking and network companies are out. We are now taking age-old tech that's meeting 1% tolerance and
 12 proposing to expand the tolerance. (existing equipment has been meeting with no issues). He does not support this
 13 item until the data has been evaluated. He recommends this item to remain developmental until more data is available.

14 The WWMA S&T Committee recommends the status remain developmental.

15 SWMA 2021 Annual Meeting: The committee heard no comments on this item. This committee recommends this
 16 item remain a Developing item so that the involved parties have more time to find a way to align the tolerances in the
 17 Handbook.

18 CWMA 2021 Interim Meeting: The committee heard comments from the floor. Diane Lee-NIST comments are in
 19 report on NCWM website. CWMA S&T Committee recommends the item move forward as a developing item.

20 NEWMA 2021 Interim Meeting: Jim Willis commented to explain the relationship of the two systems. Taxi Meters
 21 vs Transportation Network Systems and the different tolerances that are applied. The tolerances are different in the
 22 HB 44 and therefor when a taxi meter using satellite technology is used, the tolerance is tighter and therefore the
 23 playing field is not level. Lou Sakin (Hopkinton/Northbridge, MA) asked if industry has commented or questioned
 24 this procedure. Jim Willis (New York) was not aware at the time. Lou Sakin (Hopkinton/Northbridge, MA) further
 25 commented that if the playing field is not level, then he recommends a voting status. Juana Williams (NIST OWM)
 26 commented and recommended that the submitter work with the work group to fully develop the code.

27 The NEWMA Specifications and Tolerances Committee recommends that this item be given Developing Status with
 28 continued involvement with the national Taxi Meter Work Group.

CWMA Report: B3: TXI-20.1
<p>Regional recommendation to NCWM on item status:</p> <ul style="list-style-type: none"> <input type="checkbox"/> Recommend as a Voting Item on the NCWM agenda <input type="checkbox"/> Recommend as an Information Item on the NCWM agenda <input type="checkbox"/> Recommend as an Assigned Item on the NCWM agenda <i>(To be developed by an NCWM Task Group or Subcommittee)</i> <input type="checkbox"/> Recommend as a Developing Item on the NCWM agenda <i>(To be developed by source of the proposal)</i> <input checked="" type="checkbox"/> Recommend Withdrawal of the Item from the NCWM agenda <i>(In the case of new proposals, do not forward this item to NCWM)</i> <input type="checkbox"/> No recommendation from the region to NCWM <i>(If this is a new proposal, it will not be forwarded to the national committee by this region)</i>
<p>Comments and justification for the regional recommendation to NCWM: <i>(This will appear in NCWM reports)</i></p> <p>No comments from the floor. Withdrawal per submitter’s request.</p>

1 Additional letters, presentation and data may have been submitted for consideration with this item. Please refer to
2 <https://www.ncwm.com/publication-16> to review these documents.

3 **BLOCK 4 ITEMS (B4) ELECTRONICALLY CAPTURED TICKETS OR RECEIPTS**

4 *NOTE: The item under consideration reflects changes that were received by the committee from the submitter of the*
5 *item and that the Committee agreed to during its 2021 Interim Meeting work session. The changes are highlighted.*

6 **Source:**
7 Kansas Department of Agriculture, Division of Weights and Measures

8 **Purpose:**
9 Allow recorded values to be captured electronically as an alternative to a printed ticket or receipt.

10 **B4: GEN-21.2 D G-S.5.6. Recorded Representations.**

11 **Item Under Consideration:**
12 Amend Handbook 44, General Code as follows:

13 **G-S.5.6. Recorded Representations.** – Insofar as they are appropriate, the requirements for indicating and
14 recording elements shall also apply to recorded representations. All recorded values shall be ~~printed provided~~
15 ~~presented~~ digitally. In applications where recorded representations are required by a specific code, the customer
16 may be given the option of not receiving the recorded representation. Unless otherwise specified, recorded
17 representations referenced in specific codes shall be made available to the customer as a minimum in hard
18 copy form. However, for systems equipped with the capability of issuing an electronic receipt, ticket, or other
19 recorded representation, the customer may be given the option to receive any required information electronically
20 (e.g., via cell phone, computer, etc.) in lieu of or in addition to a hard copy.
21 (Amended 1975, 2014 and 20XX)

CWMA Report: B4: GEN-21.2	
Regional recommendation to NCWM on item status:	
<input type="checkbox"/>	Recommend as a Voting Item on the NCWM agenda
<input type="checkbox"/>	Recommend as an Information Item on the NCWM agenda
<input type="checkbox"/>	Recommend as an Assigned Item on the NCWM agenda <i>(To be developed by an NCWM Task Group or Subcommittee)</i>
<input checked="" type="checkbox"/>	Recommend as a Developing Item on the NCWM agenda <i>(To be developed by source of the proposal)</i>
<input type="checkbox"/>	Recommend Withdrawal of the Item from the NCWM agenda <i>(In the case of new proposals, do not forward this item to NCWM)</i>
<input type="checkbox"/>	No recommendation from the region to NCWM <i>(If this is a new proposal, it will not be forwarded to the national committee by this region)</i>
Comments and justification for the regional recommendation to NCWM: (This will appear in NCWM reports)	
Charlie Stutesman – KS – Should remain as developing. The item will be ready to present for status upgrade during the 2023 Interim meeting, or will be withdrawn.	
Russ Vires – SMA - The SMA supports this item. The SMA recognizes the importance of providing flexible options for recorded representations to the consumer.	
The CWMA S&T Committee recommends this item remain as developing per the submitter’s request.	

1 **B4: LMD-21.2 D** S.1.6.5. Money Value Computations., UR.3. Use of a Device.

2 **Item Under Consideration:**

3 Amend Handbook 44, Liquid Measuring Devices Code as follows:

4 **S.1.6.5. Money-Value Computations**

5 ...

6 ***S.1.6.5.6. Display of Quantity and Total Price, Aviation Refueling Applications.***

7 (a) *The quantity shall be displayed throughout the transaction.*

8 (b) *The total price shall also be displayed under one of the following conditions:*

9 (1) *The total price can appear on the face of the dispenser or through a controller adjacent to the*
10 *device.*

11 (2) *If a device is designed to continuously compute and display the total price, then the total price*
12 *shall be computed and displayed throughout the transaction for the quantity delivered.*

13 (c) *The total price and quantity shall be displayed for at least five minutes or until the next transaction*
14 *is initiated by using controls on the device or other customer-activated controls.*

15 (d) *A ~~printed~~ receipt shall be available and shall include, at a minimum, the total price, quantity, and*
16 *unit price.*

17 [*Nonretroactive as of January 1, 2008*]

18 (Added 2007) (**Amended 20XX**)

19 ***S.1.6.7. Recorded Representations.*** – *Except for fleet sales and other price contract sales and for*
20 *transactions where a post-delivery discount is provided, a ~~printed~~ receipt providing the following information*
21 *shall be available through a built-in or separate recording element for all transactions conducted with point-of-*
22 *sale systems or devices activated by debit cards, credit cards, and/or cash:*

23 (a) *the total volume of the delivery;**

24 (b) *the unit price;**

25 (c) *the total computed price;**

26 (d) *the product identity by name, symbol, abbreviation, or code number;* and*

27 (e) *the dispenser designation by either an alphabetical or numerical description.***

28 **[Nonretroactive as of January 1, 1986] **[Nonretroactive as of January 1, 2021]*

29 (Added 1985) (Amended 1997, 2012, 2014, 2018 and **20XX**)

30 ***S.1.6.8. Recorded Representations for Transactions Where a Post-Delivery Discount(s) is Provided.*** –
31 *Except for fleet sales and other price contract sales, a ~~printed~~ receipt providing the following information shall*
32 *be available through a built-in or separate recording element that is part of the system for transactions involving*
33 *a post-delivery discount:*

34 (a) *the product identity by name, symbol, abbreviation, or code number;*

- 1 (b) transaction information as shown on the dispenser at the end of the delivery and prior to any post-delivery
2 discount(s), including the:
- 3 (1) total volume of the delivery;
- 4 (2) unit price; and
- 5 (3) total computed price of the fuel sale.
- 6 (c) an itemization of the post-delivery discounts to the unit price;
- 7 (d) the final total price of the fuel sale after all post-delivery discounts are applied; and
- 8 (e) *the dispenser designation by either an alphabetical or numerical description.*
9 *[Nonretroactive as of January 1, 2021]*
10 (Added 2012) (Amended 2014, ~~and~~-2018, and 20XX)

11 ...

12 **UR.3. Use of a Device**

13 ...

14 **UR.3.3. Computing Device** – Any computing device used in an application where a product or grade is
15 offered for sale at one or more unit prices shall be used only for sales for which the device computes and displays
16 the sales price for the selected transaction.

17 (Became retroactive 1999)

18 (Added 1989) (Amended 1992)

19 The following exceptions apply:

- 20 (a) Fleet sales and other price contract sales are exempt from this requirement.
- 21 (b) A truck stop dispenser used exclusively for refueling trucks is exempt from this requirement provided
22 that:
- 23 (1) all purchases of fuel are accompanied by a ~~printed~~ receipt of the transaction containing the
24 applicable price per gallon, the total gallons delivered, and the total price of the sale; and
25 (Added 1993)
- 26 (2) unless a dispenser complies with S.1.6.4.1. Display of Unit Price, the price posted on the dispenser
27 and the price at which the dispenser is set to compute shall be the highest price for any transaction
28 which may be conducted.
29 (Added 1993)
- 30 (c) A dispenser used in an application where a price per unit discount is offered following the delivery is
31 exempt from this requirement, provided the following conditions are satisfied:
- 32 (1) the unit price posted on the dispenser and the unit price at which the dispenser is set to compute
33 prior to the application of any discount shall be the highest unit price for any transaction;
34 (Amended 2014)

(2) all purchases of fuel are accompanied by a receipt recorded by the system. The receipt shall contain:

- a. the product identity by name, symbol, abbreviation, or code number;
- b. transaction information as shown on the dispenser at the end of the delivery and prior to any post-delivery discount including the:
 - 1. total volume of the delivery;
 - 2. unit price; and
 - 3. total computed price of the fuel sale prior to post-delivery discounts being applied.
- c. an itemization of the post-delivery discounts to the unit price; and
- d. the final total price of the fuel sale.

(Added 2012) (Amended 2014)
 (Added 1989) (Amended 1992, 1993, 2012, ~~and 2014,~~ and 20XX)

UR.3.4. ~~Printed Ticket, Recorded Representation.~~ – The total price; the total volume of the delivery; the price per liter or gallon; *and a corresponding alpha or numeric dispenser designation** shall be ~~shown, either printed recorded~~ by the device ~~or in clear hand script,~~ on any ~~printed ticket issued by a device and recorded representation~~ containing any one of these values and shall comply with G-S.5.6. Establishments where no product grades are repeated are exempt from the dispenser designation requirement.

**[Nonretroactive as of January 1, 2021]*
 (Amended 2001, 2018, ~~and 2019,~~ and 20XX)

B4: VTM-21.1 D S.1.1. Primary Elements., UR.2. User Requirements

Item Under Consideration:

Amend Handbook 44, Vehicle Tank Meter Code as follows:

S.1.1. Primary Element

S.1.1.1. General. – A meter shall be equipped with a primary indicating element. ~~and may also be equipped with a primary recording element.~~ Except for systems used solely for the sale of aviation fuel into aircraft and for aircraft-related operations, a meter shall be equipped with a primary recording element.

(Amended 1993 and 20XX)

~~**Note:** Except for systems used solely for the sale of aviation fuel into aircraft and for aircraft related operations, vehicle tank meters shall be equipped with a primary recording element as required by paragraph UR.2.2. **Ticket Printer; Customer Ticket, Recorded Representation**~~

~~(Amended 1993 and 20XX)~~

...

S.1.4.2. ~~Printed Ticket, Recorded Representation.~~ – If a computing-type device issues a ~~printed ticket recorded representation~~ which displays the total computed price, the ~~ticket recorded representation~~ shall ~~also have printed clearly thereon record~~ the total quantity of the delivery, the appropriate fraction of the quantity, and the price per unit of quantity.

(Amended 1989, and 20XX)

1 ...

2 **UR.2. User Requirements.**

3 ...

4 **UR.2.2. ~~Ticket Printer, Customer Ticket Recording Element.~~** – Vehicle-Mounted metering systems shall
5 be equipped with ~~a ticket printer which shall be used for~~ means to record all sales where product is delivered
6 through the meter and shall comply with G-S.5.6. A copy of the ticket issued by the device shall be ~~left with~~
7 provided to the customer at the time of delivery or as otherwise specified by the customer.
8 (Added 1993) (Amended 1994, and 20XX)

9 **B4: LPG-21.1 D S.1.1. Primary Elements., UR.2. User Requirements**

10 **Item Under Consideration:**

11 Amend Handbook 44, LPG and Anhydrous Ammonia Liquid-Measuring Devices Code as follows:

12 **S.1.1. Primary Elements.**

13 **S.1.1.1. General.** – A meter shall be equipped with a primary indicating element and may also be equipped
14 with a primary recording element.

15 **Note:** Vehicle-mounted metering systems shall be equipped with a primary recording element as required
16 by paragraph UR.2.6. ~~Ticket Printer; Customer Ticket~~ Recorded Representation
17 (Amended 20XX)

18 ...

19 **S.1.1.6. ~~Printed Ticket, Recorded Representation~~** – Any ~~printed ticket issued~~ recorded representation
20 created by a device of the computing type ~~on which there is printed~~ includes the total computed price, shall
21 ~~have printed clearly~~ also include thereon the total volume of the delivery in terms of liters or gallons, and
22 the appropriate decimal fraction of the liter or gallon, and the corresponding price per liter or gallon.
23 (Added 1979) (Amended 1987, and 20XX)

24 ...

25 **S.1.5.5. Recorded Representations for Transactions Where a Post-Delivery Discount(s) is**
26 **Provided.** – Except for fleet sales and other price contract sales, a ~~printed receipt~~ recorded representation
27 providing the following information shall be available through a built-in or separate recording element that
28 is part of the system for transactions involving a post-delivery discount:

- 29 (a) the product identity by name, symbol, abbreviation, or code number;
- 30 (b) transaction information as shown on the dispenser at the end of the delivery and prior to any post-
31 delivery discount(s), including the:
- 32 (1) total volume of the delivery;
- 33 (2) unit price; and
- 34 (3) total computed price of the fuel sale.
- 35 (c) an itemization of the post-delivery discounts to the unit price; and

1 (d) the final total price of the fuel sale after all post-delivery discounts are applied.

2 (Added 2016) (Amended 20XX)

3 ...

4 **UR.2. User Requirements.**

5 ...

6 **UR.2.6. ~~Ticket Printer, Customer Ticket. Recorded Representation~~** – Vehicle-Mounted metering
 7 systems shall be equipped with ~~a ticket printer which shall be used for~~ **means to record** all sales where product
 8 is delivered through the meter **and shall comply with G-S.5.6.** A copy of the ~~ticket recorded representation~~
 9 issued by the device shall be ~~left with~~ **provided to** the customer at the time of delivery or as otherwise specified
 10 by the customer.

11 (Added 19932) (Amended 1994, and 20XX)

12 ...

13 **UR.2.7.2. Computing Device.** – Any computing device used in an application where a product or grade is
 14 offered for sale at one or more unit prices shall be used only for sales for which the device computes and
 15 displays the sales price for the selected transaction. The following exceptions apply:

16 (a) Fleet sales and other price contract sales are exempt from this requirement.

17 (b) A truck stop dispenser used exclusively for refueling trucks is exempt from this requirement
 18 provided that:

19 (1) all purchases of fuel are accompanied by a ~~printed receipt~~ **recorded representation** of the
 20 transaction containing the applicable price per unit of measure, the total quantity delivered, and
 21 the total price of the sale; and

22 (2) unless a dispenser complies with S.1.5.1. Display of Unit Price, the price posted on the
 23 dispenser and the price at which the dispenser is set to compute shall be the highest price for
 24 any transaction which may be conducted.

25 (c) A dispenser used in an application where a price per unit discount is offered following the delivery
 26 is exempt from this requirement, provided the following conditions are satisfied:

27 (1) the unit price posted on the dispenser and the unit price at which the dispenser is set to compute
 28 shall be the highest unit price for any transaction;

29 (2) all purchases of fuel are accompanied by a receipt recorded by the system for the transaction
 30 containing:

31 a. the product identity by name, symbol, abbreviation, or code number;

32 b. transaction information as shown on the dispenser at the end of the delivery and prior to
 33 any post-delivery discount including the:

34 1. total volume of the delivery;

35 2. unit price; and

36 3. total computed price of the fuel sale prior to post-delivery discounts being applied.

- 1 c. an itemization of the post-delivery discounts to the unit price; and
- 2 d. the final total price of the fuel sale after all post-delivery discounts are applied.

3 (Added 2016) (Amended 20XX)

4 **B4: CLM-21.1 D S.1.4.1. ~~Printed Ticket~~Recorded Representation., UR.2.6.3. ~~Printed~~**
5 **~~Ticket~~Recorded Representation.**

6 **Item Under Consideration:**

7 Amend Handbook 44, Cryogenic Liquid-Measuring Devices Code as follows:

8 **S.1.4.1 ~~Printed Ticket~~ Recorded Representation** – Any ~~printed ticket~~ **recorded representation** issued
9 by a device of the computing type ~~on~~ which ~~there is printed~~ **includes** the total computed price, shall ~~have printed~~
10 **clearly thereon** also **include** the total quantity of the delivery, and the price per unit.

11 (Amended 20XX)

12 And

13 **UR.2.6.2. ~~Tickets or Invoices. Recorded representation~~** – Any ~~written invoice, or printed ticket,~~ **recorded**
14 **representation** based on a reading of a device that is equipped with an automatic temperature or density
15 compensator shall have shown thereon that the quantity delivered has been adjusted to the quantity at the NBP of
16 the specific cryogenic product or the equivalent volume of gas at NTP.

17 (Amended 20XX)

18 **UR.2.6.3. ~~Printed Ticket. Recorded Representation.~~** – Any ~~printed ticket issued~~ **recorded representation**
19 **provided** by a device of the computing type ~~on~~ which ~~there is printed~~ **includes** the total computed price, the
20 total quantity of the delivery, or the price per unit, shall also ~~show~~ **include** the other two values, ~~(either printed~~
21 ~~or in clear hand script).~~ **and shall comply with G-S.5.6.**

22 (Amended 20XX)

23 **B4: MLK-21.1 D S.1.4.2. ~~Printed Ticket~~ Recorded Representation., UR.2.6.3. ~~Printed~~**
24 **~~Ticket~~Recorded Representation.**

25 **Item Under Consideration:**

26 Amend Handbook 44, Milk Meter Code as follows:

27 **S.1.4.2. ~~Printed Ticket~~ Recorded Representation** – If a computing-type device issues a ~~printed ticket~~
28 **recorded representation** which ~~displays~~ **includes** the total computed price, the ~~ticket~~ **recorded**
29 **representation** shall ~~also have printed clearly thereon~~ **include** the total quantity of the delivery, the
30 appropriate fraction of the quantity, and the price per unit of quantity.

31 (Amended 1989, and 20XX)

32 **UR.2.2. ~~Printed Ticket. Recorded Representation.~~** – Any ~~printed ticket issued~~ **recorded representation**
33 **created** by a device of the computing type ~~on~~ which ~~there is printed~~ **includes** the total computed price, the total
34 quantity, or the price per unit of quantity, shall also ~~show~~ **include** the other two values ~~(either printed or in clear~~
35 ~~hand script).~~ **and shall comply with G-S.5.6.**

36 (Amended 1989 and 20XX)

1 **B4: MFM-21.2 D S.6. ~~Printer~~Recorded Representations., UR.2.6. ~~Ticket Printer, Customer~~**
2 **~~Ticket, Recorded Representation., UR.3.4. Printed Ticket, Recorded~~**
3 **~~Representation.~~**

4 **Item Under Consideration:**
5 Amend Handbook 44, Mass Flow Meter Code as follows:

6 **S.6. ~~Printer. Recording Element~~** – When an assembly is equipped with means for ~~printing~~recording the
7 measured quantity, the following conditions apply:

- 8 (a) the scale interval shall be the same as that of the indicator;
- 9 (b) the value of the ~~printed~~ recorded quantity shall be the same value as the indicated quantity;
- 10 (c) *the ~~printed~~ recorded quantity shall also include the mass value if the mass is not the indicated quantity;*
11 *[Nonretroactive as of January 1, 2021]*
- 12 (d) a quantity for a delivery (other than an initial reference value) cannot be recorded until the measurement
13 and delivery has been completed;
- 14 (e) the ~~printer~~ recording element is returned to zero when the resettable indicator is returned to zero; and
- 15 (f) the ~~printed~~ recorded values shall meet the requirements applicable to the indicated values.

16 (Amended 2016, and 20XX)

17 **S.6.1. ~~Printed Receipt~~ Recorded Representations.** – ~~Any~~ When a quantity is delivered, ~~printed~~
18 ~~quantity~~ the recorded representation shall include an identification number, the time and date, and the name
19 of the seller. This information may be printed by the device or pre-printed on the ticket.
20 (Amended 20XX)

21 And

22 **UR.3.3 ~~Ticket Printer, Customer Ticket, Recorded Representation.~~** – Vehicle-Mounted metering
23 systems shall be equipped with ~~a ticket printer which shall be used for~~ means to record all sales where
24 product is delivered through the meter and shall comply with G-S.5.6. A copy of the ~~ticket~~ recorded
25 representation issued by the device shall be ~~left with~~ provided to the customer at the time of delivery or as
26 otherwise specified by the customer.

27 (Added 19934) (Amended 20XX)

28 ...

29 **UR.3.4. ~~Printed Ticket, Recorded Representation.~~** – The total price, the total quantity of the delivery, and
30 the price per unit shall be ~~printed~~ provided on any ~~ticket~~ recorded representation issued by a device of
31 the computing type and containing any one of these values.

32 (Added 1993) (Amended 20XX)

33 **B4: CDL-21.1 D S.1.4.1. ~~Printed Ticket~~Recorded Representations., UR.2.4.2. ~~Tickets or~~**
34 **~~Invoices. Recorded Representation.~~**

35 **Item Under Consideration:**
36 Amend Handbook 44, Carbon Dioxide Liquid-Measuring Devices Code as follows:

1 ~~S.1.4.1. Printed Ticket. Recorded Representation~~– Any ~~printed ticket recorded representation~~ issued by a
2 device of the computing type ~~on~~ which ~~there is printed~~ includes the total computed price shall ~~have printed~~
3 ~~clearly thereon~~ also include the total quantity of the delivery and the price per unit.

4 (Amended 20XX)

5 ~~UR.2.4.2. Tickets or Invoices Recorded Representation.~~ – Any ~~written invoice or printed ticket recorded~~
6 ~~representation~~ based on a reading of a device that is equipped with an automatic temperature or density
7 compensator shall ~~have shown thereon~~ include that the quantity delivered has been temperature or density
8 compensated.

9 (Amended 20XX)

10 **B4: HGM-21.1 D S.2.6. Recorded Representations, Point of Sale Systems., S.6. Printer.**
11 **Recording Element., UR.3.2. Vehicle-mounted Measuring Systems Ticket**
12 **Printer Recording Element., UR.3.3. Printed Ticket. Recorded**
13 **Representation.**

14 **Item Under Consideration:**

15 Amend Handbook 44, Hydrogen Gas-Measuring Devices Code as follows:

16 **S.2.6. Recorded Representations, Point of Sale Systems.** – A ~~printed~~ receipt shall be available through
17 a built-in or separate recording element for transactions conducted with point-of-sale systems or devices activated
18 by debit cards, credit cards, and/or cash. The ~~printed~~ receipt shall contain the following information for products
19 delivered by the dispenser:

- 20 (a) the total mass of the delivery;
- 21 (b) the unit price;
- 22 (c) the total computed price; and
- 23 (d) the product identity by name, symbol, abbreviation, or code number.

24 (Amended 20XX)

25 ...

26 **S.6. Printer. Recording Element** – When an assembly is equipped with means for ~~printing recording~~
27 measured quantity, the ~~printed recorded~~ information must agree with the indications on the dispenser for the
28 transaction and the ~~printed recorded~~ values shall be clearly defined.

29 (Amended 20XX)

30 **S.6.1. Printed Receipt. Recorded Representation** – ~~Any~~ When a quantity is delivered, printed
31 quantity the recorded representation shall include an identification number, the time and date, and the name
32 of the seller. ~~This information may be printed by the device or pre-printed on the ticket.~~

33 (Amended 20XX)

34 And

35 **UR.3.2. Vehicle-mounted Measuring Systems ~~Ticket Printer~~ Recording Element.**

36 (Amended 20XX)

37 **UR.3.2.1. Customer Ticket Recording Element.** – Vehicle-Mounted metering systems shall be equipped
38 with ~~a ticket printer which shall be used for~~ means to record all sales where product is delivered through
39 the device and shall comply with G-S.5.6. A copy of the ~~ticket recorded representation~~ issued by the

1 device shall be ~~left with~~ provided to the customer at the time of delivery or as otherwise specified by the
 2 customer.

3 (Amended 20XX)

4 ...

5 **UR.3.3. ~~Printed Ticket. Recorded Representation.~~** – The total price, the total quantity of the delivery, and
 6 the price per unit shall be ~~printed~~ provided on any ~~ticket~~ recorded representation issued by a device of the
 7 computing type and containing any one of these values.

8 (~~Added 1993~~) (Amended 20XX)

9 **B4: OTH-21.2 D Appendix D - Definitions.: recorded representations, recording element.**

10 **Item Under Consideration:**

11 Amend Handbook 44, Appendix D - Definitions as follows:

12 **recorded representation.** – The printed, embossed, electronic, or other representation that is recorded as a
 13 quantity, unit price, total price, product identity or other information required by a weighing or measuring
 14 device. [1.10, 2.20, 2.21, 2.22, 2.24, 2.25, 3.30, 3.31, 3.32, 3.33, 3.34, 3.35, 3.36, 3.37, 3.38, 3.39, 3.40, 5.54,
 15 5.55, 5.56(a), 5.56(b), 5.57, 5.58, 5.60]

16 **recording element.** – An element incorporated in a weighing or measuring device by means of which ~~its~~ the
 17 device's performance relative to quantity or money value is permanently recorded ~~electronically or~~ on a tape,
 18 ticket, card, or the like, in the form of a printed, stamped, punched, or perforated representation or recorded
 19 electronically in instances where that option is permitted by specific code. [1.10, 2.20, 2.21, 2.22, 2.24, 2.25,
 20 3.30, 3.31, 3.32, 3.33, 3.34, 3.35, 3.36, 3.37, 3.38, 3.39, 3.40, 5.54, 5.55, 5.56(a), 5.56(b), 5.57, 5.58, 5.60]

21 **Previous Action:**

- 22 • 2021: Developing Items

23 **Original Justification:**

24 In 2014 G-S.5.6. was added to Handbook 44 to allow for the issuance of electronic receipts. At that time the use of
 25 the term “print”, and all variations on the word “print” was not fully addressed.

26 The Oxford Dictionary defines print as “a mechanical process involving the transfer of text, images, or designs to
 27 paper.”

28 The Oxford Dictionary defines record as: to “set down in writing or some other permanent form for later reference,
 29 especially officially.”

30 Values that are delivered via electronic means are recorded values and not necessarily printed vales. Printed indicates
 31 that a value has been transferred on to a hard document. While the intent of the 2014 amendment was to allow for the
 32 use of electronic receipts the terminology used is incorrect. In addition to receipts, there are instances where other
 33 information may be transmitted electronically.

34 When applying G-A.2. to weighing and measuring devices,

35 **G-A.2. Code Application.** – *This General Code shall apply to all classes of devices as covered in the specific*
 36 *codes. The specific code requirements supersede General Code requirements in all cases of conflict.*
 37 (*Amended 1972*),

1 Multiple conflicts arise in the implementation of the 2014 Amendment of G-S.5.6. This is to clarify the terminology
2 in Handbook 44 and to recognize the changing technology in how transactions are recorded, and the information is
3 disseminated.

4 **Item Development:**

5 This item has been assigned to the submitter for further development. For more information or to provide comment,
6 please contact:

7 Mr. Charles Stutesman
8 Kansas Department of Agriculture
9 785-564-6683 charles.stutesman@ks.gov

10 NOTE: The proposal as it appeared in the 2021 Interim Meeting agenda is available at
11 <https://www.ncwm.com/interim-archive>.

12 **Comments in Favor:**

13 **Regulatory:**

- 14 • 2021 Interim: Mr. Charles Stutesman (KS), submitter of the item, agreed that the item should be
15 developing and noted that updates to the item under consideration were provided to the S&T Committee
16 based on reviews that he had with NIST, OWM.
- 17 • 2021 Annual: Mr. Charles Stutesman (KS) looks forward to maintaining developing status between now
18 and Interim. When electronic receipt provision was put in GC, it works well but specific codes
19 supersede. All the sections in this block have printer requirements. The goal was not to remove printers
20 but to add the option for electronic receipts if customer wants it. He would appreciate comments on how
21 to clean up the proposal.
- 22 • 2022 Interim: The submitter of the item commented the item needs editing and further work before
23 voting. Recommends the item remain developing.
- 24 • 2022 Interim: A regulator from California DMS recommends the item remain developing.

25
26
27 **Industry:**

- 28 • 2021 Interim: Mr. Dmitri Karimov (MMA) commented that the proposed changes to recognize
29 electronically captured tickets are needed, editorial corrections are needed to some parts of the proposal,
30 and he agreed with a developing status for this item.
- 31 • 2022 Interim: A member of industry representing MMA commented general support with some edits to
32 the language and supports further development.
- 33 • 2022 Interim: A member of industry representing SMA supports the item, as it recognizes the importance
34 of providing flexible options for recorded representations to customers and sees value in the item as
35 developing.

36 **Advisory:**

- 37 • 2021 Interim: Ms. Diane Lee (NIST OWM) commented that there are two proposed changes to HB 44,
38 Mass Flow Meter Code, Paragraph U.R.3.3 in the 2021 Interim Agenda. One proposal is Block 4 MFM-
39 21.2 UR.3.3. (which was incorrectly number as UR.2.6 in the item under consideration in the 2021
40 Interim Meeting agenda) and the other is item MFM-21.1. UR.3.3. on the 2021 Interim Meeting agenda.
41 The submitters should work together to provide one proposed change.
- 42 • 2022 Interim: An advisory member representing NIST OWM agrees with the need to address current
43 language in the proposal and supports development.

44 **Comments Against:**

45 **Regulatory:**

1 • 2022 Interim: No comments heard.

2 **Industry:**

3 • 2022 Interim: No comments heard.

4 **Advisory:**

5 • 2022 Interim: No comments heard.

6
7 **Neutral Comments:**

8 **Regulatory:**

9 • 2022 Interim: No comments heard.

10 **Industry:**

11 • 2022 Interim: No comments heard.

12 **Advisory:**

13 • 2022 Interim: No comments heard.

14
15 **Item Development:**

16 NCWM 2022 Interim Meeting: The Committee assigned a developing status for this item at the 2022 Interim Meeting.
17 The committee supports the work and recommends the continued work with all stakeholders. For more information
18 or to provide comment, please contact:

19 Mr. Charles Stutesman
20 Kansas Department of Agriculture
21 785-564-6683 charles.stutesman@ks.gov

22 NOTE: The proposal as it appeared in the 2021 Interim Meeting agenda is available at
23 <https://www.ncwm.com/interim-archive>.

24 **Regional Associations' Comments:**

25 WWMA 2021 Annual Meeting: Matt Douglas (California - DMS): California supports further development of the
26 block. Russell Vires (SMA): SMA supports 2 of the items GEN-21.2, OTH-21.2. Diane Lee (NIST OWM): carryover
27 item. NIST has comments on this item posted. They support it as a developing item going forward.

28
29 The WWMA S&T Committee recommends the status remain developmental. The Committee recommends that the
30 submitter continue to work with NIST OWM to further develop the item.

31 SWMA 2021 Annual Meeting: Russ Vires, SMA, stated that he supports this item. Tim Chesser, State of Arkansas,
32 suggested changing the wording in Gen 21.1. His suggestion is to change "presented" to "available".

33
34 This committee recommends this item remain Developing, so they have an opportunity to work with the NIST OWM
35 to clarify and clean up the language.

36 CWMA 2021 Interim Meeting: Charles Stutesman-Kansas (submitter) mentioned that he hoped to have more
37 information to NCWM Interim Meeting and supported this item staying as developing. Diane Lee-NIST stated there
38 are comments on this item in OWM's Analysis that was sent to the committee. Supports this item as developing. Lou
39 Straub-SMA supports OTH-21.2.

40
41 CWMA S&T Committee recommends item as developing.

1 NEWMA 2021 Interim Meeting: Jim Willis (New York) commented that it is important to recognize that the future
2 will bring us to electronically captured tickets or receipts. Lou Straub SMA, John McGuire (New Jersey), and Jim
3 Willis (New York) all recommended to move this item forward as voting.
4

5 The NEWMA Specifications and Tolerances Committee recommends that this item be given Voting Status.

6 Additional letters, presentation and data may have been submitted for consideration with this item. Please refer to
7 <https://www.ncwm.com/publication-16> to review these documents.

8 **ITEM BLOCK 5 (B5) DEFINE “FIELD REFERENCE STANDARD”**

9 *NOTE: In 2019 this block of items was combined with Block 1 “Terminology For Testing Standards” and other items*
10 *that addressed terminology for standards and the use of “master meters.” Based on comment heard during the 2021*
11 *Annual Meeting, the S&T Committee recommended that all items that were included in Block 1 “Terminology For*
12 *Testing Standards” that originally appeared as a separate item or a separate block of items on the S&T agenda prior*
13 *to 2019, be removed from Block 1 “Terminology For Testing Standards” and appear as originally presented.*
14

15 *Item Block 5 “Define “Field Reference Standard”” was removed from Block 1 “Terminology For Testing Standards”*
16 *and now appears as a separate block of items on the 2022 Interim Meeting agenda.*

17 **Source:**

18 Endress + Hauser Flowtec AG USA (2018)

19 **Purpose:**

20 Add definition field reference standard meter to HB 44. Delete transfer standard definition. Change terms in sections
21 3.34, 3.38 and 3.39.

22 **B5: CLM-18.2 W N.3.2. Transfer Standard Test and T.3. On Tests Using Transfer Standards**

23 **Item Under Consideration:**

24 Amend Handbook 44, Cryogenic Liquid-Measuring Devices Code as follows:

25 **N.3.2. Field Reference ~~Transfer~~ Standard Meter Test.** – When comparing a meter with a calibrated **field**
26 **reference ~~transfer~~ standard meter.** the test draft shall be equal to at least the amount delivered by the device in
27 two minutes at its maximum discharge rate, and shall in no case be less than 180 L (50 gal) or equivalent thereof.
28 When testing uncompensated volumetric meters in a continuous recycle mode, appropriate corrections shall be
29 applied if product conditions are abnormally affected by this test mode.

30 (Amended 1976 **and 20XX**)

31 **T.3. On Tests Using ~~Field Reference~~ Standards Meters.** – To the basic tolerance values that would
32 otherwise be applied, there shall be added an amount equal to two times the standard deviation of the applicable
33 **field ~~reference~~ standard meter** when compared to a basic reference standard. (Added 1976)

34 **B5: CDL-18.2 W N.3.2. Transfer Standard Test and T.3. On Tests Using Transfer Standards**

35 **Item Under Consideration:**

36 Amend Handbook 44, Carbon Dioxide Liquid-Measuring Devices Code as follows:

37 **N.3.2. ~~Field Reference~~ Standard Meter Test.** – When comparing a meter with a calibrated **field**
38 **referencetransfer standard meter.** the test draft shall be equal to at least the amount delivered by the device in
39 two minutes at its maximum discharge rate.

40 **(Amended 20XX)**

1 **T.3. On Tests Using Field Reference~~Transfer Standards~~ Meters.** – To the basic tolerance values that would
 2 otherwise be applied, there shall be added an amount equal to two times the standard deviation of the applicable
 3 field reference~~transfer~~ standard when compared to a basic field reference~~reference~~ standard meter.

4 **B5: HGM-18.2 W N.4.1. Master Meter (Transfer) Standard Test and T.4. Tolerance**
 5 **Application on Test Using Transfer Standard Test Method**

6 **Item Under Consideration:**

7 Amend Handbook 44, Hydrogen Gas-Measuring Devices Tentative Code as follows:

8 **N.4.1. Field Reference~~Master Meter (Transfer) Standard~~ Meter Test.** – When comparing a measuring system
 9 with a calibrated field reference~~transfer~~ standard meter, the minimum test shall be one test draft at the declared
 10 minimum measured quantity and one test draft at approximately ten times the minimum measured quantity or 1
 11 kg, whichever is greater. More tests may be performed over the range of normal quantities dispensed.

12 **(Amended 20XX)**

13 **T.4. Tolerance Application on Test Using Field Reference~~Transfer Standard~~ Meters Test Method.** – To the basic
 14 tolerance values that would otherwise be applied, there shall be added an amount equal to two times the standard
 15 deviation of the applicable field reference~~transfer~~ standard meter when compared to a basic reference standard.

16 **B5: OTH-18.3 W Appendix D – Definitions: field reference standard meter and transfer**
 17 **standard**

18 **Item Under Consideration:**

19 Amend Handbook 44, Appendix D as follows:

20 **field reference standard meter – A measurement system designed for use in proving and testing measuring**
 21 **devices and meters.**

22 ~~**transfer standard – A measurement system designed for use in proving and testing cryogenic liquid-**~~
 23 ~~**measuring devices.**~~

24 **Background/Discussion:**

25 These items have been assigned to the submitter for further development. For more information or to provide
 26 comment, please contact:

27 Mr. Michael Keilty
 28 Endress + Hauser Flowtec AG USA
 29 970-586-2122, michael.keilty@us.endress.com

30 During S&T open hearings discussion in July 2017 it was pointed out that the term transfer standard which is used in
 31 the proposal to amend HB44 3.37 N.3 and 3.32 N.3 Test Drafts is incorrect. The statement made also suggested that
 32 the use of transfer standard is incorrectly used in HB44 code sections 3.34, 3.38 and 3.39. It was suggested that a more
 33 appropriate term to use is field reference standard or field reference standard meter. There is no definition in OIML
 34 G18 which supports the use of the term transfer standard. There is suggestive basis to support reference standard as it
 35 is used textually in OIML G18.

36 NIST has no procedural documents in place to justify the revision with a definition. The definition of transfer standard
 37 is used in code sections 3.34, 3.38 and 3.39 and that those sections do not need to change.

38 Committee received written comments on all items in Block 4 and Block 5, as well as LPG-4 and MFM-2 emphasizing
 39 the need for there to be more study and discussion of the issues to assess the ramifications of all the proposed changes.
 40 The Committee also received written comments from the SMA that it looks forward to further information on these

1 items and stating that it is important to be consistent in our use of terms across multiple sections of NIST Handbook
2 44. The Committee agreed to carryover this group of items on its 2019 agenda to allow for further discussion and
3 development of these proposals.

4 NCWM 2019 Interim Meeting: The S&T Committee decided to combine the items on the agenda dealing with the
5 issue of transfer standard (including items already combined into blocks) into one block. Block 1 (New) of the Interim
6 Meeting report now includes Gen-3, Block 1 (original items from the 2019 interim agenda that appeared under Block
7 1), Block 2, LPG-3, and MFM-5, which were all separate items and blocks of items on the S&T Committee's 2019
8 Interim Meeting agenda (NCWM Publication 15). Agenda items Gen-3, Block 1, Block 2, LPG-3, and MFM-5 are
9 listed separately on the Interim agenda with a note added beneath each individual item referring the reader to the New
10 B1 items. All items under this New B1 have retained the same numbering system for ease in referring to the appendix
11 for discussion on each item.

12 NCWM 2019 Annual Meeting: Mr. Brett Gurney (NCWM Chairman) commented regarding the formation of a Task
13 Group assigned to further develop this block proposal. The TG is charged with providing definitions for various types
14 of standards (transfer, field, reference, etc.) as well as the criteria to be met by these types of standards. The completion
15 date given to the TG is July 2021. The Committee agreed to the Assigned status for this block of items and looks
16 forward to hearing updates from the TG. the Chair of the task group was:

17 Mr. Jason Glass
18 Kentucky Department of Agriculture
19 502-573-0282, jason.glass@ky.gov

20 NCWM 2020 Interim Meeting: Field Standard TG Chair Jason reported that the Task Group met prior to the Interim
21 meeting and has begun discussion of the items under Block 1. Mr. Glass stated that bi-weekly teleconference meetings
22 were scheduled and that the group was optimistic but had significant work to accomplish.

23 Mr. Russ Vires (SMA) supports the Scale item, SCL 18.1; in this block, Mr. Dimitri Karimov (Meter Manufacturers
24 Association) supports the Task Group activities, Mrs. Tina Butcher was encouraged with the progress on terminology
25 and provided an update on the Mass Flow Meter testing reporting that field testing was conducted October 28 to
26 November 1, 2019 and that State and Industry participation included Colorado, Florida, Oregon, Emerson, and Tulsa
27 Gas Technology.

28 Mr. Kurt Floren (Los Angeles County, California) raised concerns with GEN-19.1. regarding the definition of
29 "Standard, Field" and its reference to "stable" standards and how long a standard is expected to be stable, which is
30 typically 1-year, for which he believes should be longer. Mr. Floren also questioned the statement in the definition
31 "tested over a range of environmental and operational conditions that the measuring devices is used..." Mr. Floren
32 noted that he was unsure if all laboratories will have the capabilities to test over this wide range of conditions. Mr.
33 Floren also expressed concerns with the definition "Standard, Transfer" citing that this standard may not meet the
34 fundamental considerations requirement for standards over a long period of time or wide range of environmental
35 conditions.

36 Mr. Steve Harrington (Oregon) echoed Mr. Floren's comments. Field Standard TG Chair Glass responded that these
37 are concerns of the TG and these issues will be discussed and considered as the TG develops these items.

38 During the Committee's work session, the Committee agreed that this item should remain an Assigned item.

39 NCWM 2021 Interim Meeting: NCWM Field Standard TG Chair, Jason Glass provided an update on the Task Group
40 activities. Mr. Glass reported that the field standard Task Group is following the activities of the NIST Master Meter
41 Project and that the Task Group reviewed API specifications for use of master meters as a standard and a test protocol
42 that will be used to ensure uniformity in collecting data on master meters used as field standards. He also reported
43 that the TG does not have a recommendation for this item. Mr. Glass also reported that he would be stepping down
44 as the TG Chair. Mr. Mike Keilty (Endress+Hauser AG) thanked Chair Glass and the TG for their work and requested
45 that Block 1, LPG-15.1, N.3. and Block 1 MFM-15.1, N.3 be removed from Block 1 items and to allow those items
46 to move forward separate from the other Block 1 Items. Mr. Keilty stated that similar language was added to the

1 Hydrogen code and that the proposed language in LPG-15.1 N.3. and MFM-15.1, N.3 will allow for the recognition
 2 of master meters as field standards. Mr. Henry Oppermann (WM-Consulting), stated that data is needed to ensure that
 3 master meters can be used over a range of conditions. Mr. Robert Murnane (Seraphin) stated that jurisdictions have
 4 the ability to use meters and that Block 1 LPG-15.1, N.3 and Block 1 MM-15.1, N.3 should remain in Block 1 until
 5 data is available to support the use of master meters as a standard. Mr. Keilty mentioned that there has been useful
 6 dialog regarding master meters in the TG, but that he is concerned that the TG is not close to deciding and he expressed
 7 concerns with the TG’s focus on the NIST Master Meter Project. Mrs. Tina Butcher (NIST OWM) provided an update
 8 on the NIST Master Meter Project and noted that States have the regulatory powers to accept or reject a standard. She
 9 also mentioned that NIST is working with States to collect data needed to assess master meters and preliminary testing
 10 was conducted and data was collected on CNG at Tulsa Gas Technology’s facility in fall 2019. Ms. Diane Lee (NIST
 11 OWM) noted that NIST OWM feels that it is premature to add more language to the Handbook 44 on master meters
 12 without data to support its use.

13 During the Committee’s work session, the Committee agreed to keeps all items in Block 1 and that this item should
 14 remain with an Assigned status.

15 NCWM 2021 Annual Meeting: Mr. Glass reported that he would be stepping down as the Field Standard TG Chair.
 16 The Committee heard updates from members of the Task Group during open hearings. Mr. Michael Keilty noted that
 17 two of the items had been on the agenda since 2015 and requested that they be removed from the block and
 18 recommended recognizing the use of master meters. Other comments were to keep the items together until data is
 19 analyzed from the NIST Field Reference Standard Work Group to support the use of master meters but that if some
 20 items were removed from the block, all items should be removed from the block. Based on comments heard during
 21 the 2021 Annual Meeting, the S&T Committee recommended that all items that were included in Block 1
 22 “Terminology For Testing Standards” that originally appeared as a separate item or a separate block of items on the
 23 S&T agenda in and prior to 2019, be removed from Block 1 “Terminology For Testing Standards” and appear as
 24 originally presented.

25 During the 2021 Committee work session the Committee recognized that the Task Group has accomplished all it is
 26 able to at this point and is recommending the Task Group be disbanded and will make said recommendation to the
 27 NCWM Chairman. The Committee agreed to break all items in Block 1 into individual items and designate them all
 28 as Developing. The Committee thanks the Task Group and its members for their work.

29 NCWM 2022 Interim Meeting: Mr. Michael Keilty (the submitter of the items) provided written comments to the
 30 committee requesting that the block of items be withdrawn. Mr. Keilty also requested during the open hearing that
 31 these items be withdrawn. Ms. Diane Lee (NIST) agreed with the submitter and recommended that the items be
 32 withdrawn.

33 During the S&T Committee work session, the committee agreed to recommend this item for withdrawal.

34 **Regional Association Comments:**

35 WWMA 2021 Annual Meeting: Michael Keilty (Endress + Hauser) : he submitted these in 2017, sept. in response to
 36 NIST comments. NIST committed a form 15 in that same year with the language from Block 1. He had hoped that the
 37 task group formed in 2019 would have addressed block 1 and 5 items. Lang. in block 5 is in line with (LPG-15.1 and
 38 MFM-15.1). Language in documents was copied and inserted. asks committee to look at language specific to the item
 39 and not the general block. Kurt Floren (LA County) : last reference was to block 5, error. Michael Keilty (Endress +
 40 Hauser) : Would like to move from developing to a voting status in the 2022 cycle. Bob Murnane (Seraphin) : new
 41 terminology that does not exist in HB currently. The definition proposed is vague. It does not limit the tolerance for
 42 field standard. W/M officials needs to know that enforcement is legally enforceable. HB44 recognizes use of transfer
 43 standards and their uncertainty exceeds the 1/3. Several companies have proposed that mass flow meters be used.
 44 NIST is collecting data to evaluate Coriolis meter to possibly use as a field standard. it would be wrong to recognize
 45 Coriolis meter as a field standard (and that is what this is doing) without the proper tests. Doesn’t think we need new
 46 terminology. the existing terms (transfer standard / field standard) be worked on. Recommends that this item be
 47 withdrawn. Josh Nelson (Ex-Officio NCWM S&T Committee) : Question: can he submit to the committee his notes?
 48 He will. Recommend entire block be withdrawn? Bob Murnane (Seraphin) : Yes (in reference to above testimony),
 49 withdraw entire block. Michael Keilty (Endress + Hauser) : to follow up on Bob: these were not submitted to

1 undermine the 1/3 tolerance. It is just assumed that the device will perform and the data will be provided. This is just
2 enabling language.

3 The WWMA S&T Committee recommends the status remain developmental. The Committee recommends that items
4 MFM-15.1 and LPG-15.1 be inserted into Block 5 items as they refer to the same terminology in HB:44. A letter was
5 submitted to the Committee by Bob Murnane (Seraphin) and will be posted to the NCWM website.

6 SWMA 2021 Annual Meeting: Mr. Keilty, Endress + Hauser, who is the submitter of this item, stated that he hoped
7 the Field Standard Task Group would have worked on Blocks 1 and 5, but, unfortunately, that was not the case. He
8 recommended this item be Withdrawn. Russ Vires, Mettler Toledo, recommended the Withdrawal of this item. Mr.
9 Oppermann, Weights and Measures Consulting, Seraphin, supports Withdrawal of this item.

10 This committee recommends this item be Withdrawn at the submitters request.

11 CWMA 2021 Interim Meeting: Michael Keilty-Endress+Hauser Flow (submitter) recommends that item be
12 withdrawn.
13

14 CWMA S&T Committee recommends that item be withdrawn.

15 NEWMA 2021 Interim Meeting: Michael Keilty (Endress + Hauser Flowtec) has submitted comments and is
16 requesting withdrawal of the items in this block. Further comments were heard from Juana Williams (NIST OWM)
17 on the history of the item. Comments were received in support of withdrawal.

18 The NEWMA Specifications and Tolerances Committee recommends Withdrawal of this item.

19 Additional letters, presentation and data may have been submitted for consideration with this item. Please refer to
20 <https://www.ncwm.com/publication-16> to review these documents.

21 **BLOCK 6 ITEMS (B6) COMMERCIAL AND LAW ENFORCEMENT, AXLE AND**
22 **AXLE GROUP WEIGHTS**

23 **Source:**

24 NIST, Office of Weights and Measures

25 **Purpose:**

26 This proposed change is intended to add clarification regarding the implications of using weighing and measuring
27 devices for transactions that may be considered by some as commercial while there is no clear guidance provided.
28

29 **B6: SCL-22.1 D Recorded Representation of Axle or Axle Group Weights**

30 **Item Under Consideration:** Amend NIST Handbook 44, Scales Code as follows:

31 **S.1.14. Recorded Representations, Multi-Independent Platform¹ Vehicle Scale Systems**

32 **S.1.14.1. Axle and Axle Group Loads. – All recorded representations of the different axle and axle**
33 **group loads of a vehicle weighed on a multi-independent platform vehicle scale system shall be**
34 **identified by providing indication of either:**

35 **(a) the portion of the vehicle to which they represent (e.g., “axle-group 1, axle group 2, axle group**
36 **3,” or if using axle and axle group descriptions, “steering axle, drive axles, trailer axles”), or**

37 **(b) the particular independent scale platform from which they were obtained (e.g., “Platform 1,**
38 **Platform 2, Platform 3”).**

S.1.14.2. Total Vehicle Weight. – If a summed total of all axle and axle group loads of a vehicle weighed on a multi-independent platform vehicle scale system is recorded, the recorded value shall be clearly identified as:

- (a) “Total Vehicle Weight,” “Vehicle Weight,” (or other similar terms that clearly identify the value as the vehicle’s total weight) providing all axle(s) and axle groups of the vehicle weighed were positioned on a live portion of the weighing/load-receiving elements and weighed simultaneously when the summed total was determined², or**
- (b) “Not-Legal-For-Trade” unless all axle and axle groups of the vehicle weighed were simultaneously positioned on a live portion of the weighing/load-receiving elements when the summed total was determined, or the vehicle was weighed using the alternative method described in footnote 2 of this paragraph.**

¹**Multi-independent platform means each platform of the scale is a single independent weighing/load-receiving element unattached to adjacent elements and with its own A/D conversion circuitry and displayed weight.**

²**Alternatively, the individual components of the vehicle being weighed may be uncoupled, positioned completely on the live elements of the scale, weighed separately, and then totaled.**

[subsequent requirements to be renumbered as appropriate]

CWMA Report: B6: SCL-22.1
<p>Regional recommendation to NCWM on item status:</p> <ul style="list-style-type: none"> <input type="checkbox"/> Recommend as a Voting Item on the NCWM agenda <input type="checkbox"/> Recommend as an Information Item on the NCWM agenda <input type="checkbox"/> Recommend as an Assigned Item on the NCWM agenda <i>(To be developed by an NCWM Task Group or Subcommittee)</i> <input checked="" type="checkbox"/> Recommend as a Developing Item on the NCWM agenda <i>(To be developed by source of the proposal)</i> <input type="checkbox"/> Recommend Withdrawal of the Item from the NCWM agenda <i>(In the case of new proposals, do not forward this item to NCWM)</i> <input type="checkbox"/> No recommendation from the region to NCWM <i>(If this is a new proposal, it will not be forwarded to the national committee by this region)</i>
<p>Comments and justification for the regional recommendation to NCWM: <i>(This will appear in NCWM reports)</i></p> <p>Russ Vires – SMA - The SMA recommends that Block 6 be broken apart into two (2) individual items. Each of these items deals with a separate topic that needs to be discussed individually. Regarding SCL-22.1: The SMA supports this item with the following changes: <u>“S.1.14.1. Axle and Axle Group Loads. - All recorded representations of the different axle and axle group loads of a vehicle when weighed in a single draft on a multi-independent platform vehicle scale system shall be identified by providing indication of either:”</u></p> <p>Identifying the recorded weight values for the axle/axle groups as required in S.1.14.1.(a) is only necessary when the vehicle can be weighed in a single draft.</p>

B6: SCL-22.3 D UR.3.3. Single-Draft Vehicle Weighing., and UR.3.4. Axle and Axle Group Weight Values.

Item Under Consideration:

Amend Handbook 44, Scales Code as follows:

1 **UR.3.3. Single-Draft Vehicle Weighing.** – A vehicle or a coupled-vehicle combination shall be commercially
2 weighed on a vehicle scale only as a single draft. That is, the total weight of such a vehicle or combination shall
3 not be determined by adding together the results obtained by separately and not simultaneously weighing each
4 end of such vehicle or individual elements of such coupled combination. However, the weight of:

- 5
6 (a) a coupled combination may be determined by uncoupling the various elements (tractor, semitrailer,
7 trailer), weighing each unit separately as a single draft, and adding together the results; or
8
9 (b) a vehicle or coupled-vehicle combination may be determined by adding together the weights obtained
10 while all individual elements are resting simultaneously on more than one scale platform.

11 ~~Note: This paragraph does not apply to highway law enforcement scales and scales used for the collection~~
12 ~~of statistical data.~~
13 ~~(Added 1992)~~
14

15 And

16 **UR.3.4. Axle and Axle Group Weight Values.** – Weight values of axles or axle groups of highway motor
17 vehicles are necessary to verify compliance with highway weight limit enforcement. When a fee is charged
18 for the use of an axle-load scale or vehicle scale to determine the weight of axles or axle-groups, the
19 transaction is considered to be “commercial” as defined by General Code paragraph G-A.1. Commercial
20 and Law Enforcement Equipment and the scale shall comply with all applicable requirements for
21 commercial weighing systems.

22 When weight values for axles or axle groups are obtained using multiple-platform vehicle scales and where
23 all parts of the motor vehicle are simultaneously resting on live elements of the scale, the weight values for
24 axles or axle groups may be summed together to represent a commercial total gross weight of the motor
25 vehicle. Weight values for axles or axle groups may also be summed to represent a commercial total gross
26 weight of the motor vehicle if the individual components are uncoupled, positioned completely on the live
27 elements, and weighed separately on the scale.

28 Weight values of axles or axle groups obtained from these weighing devices as individual weighing
29 operations where all parts of the motor vehicle are not simultaneously resting on live portions of the scale
30 shall not be used in commercial transactions and may only be used to verify compliance with highway
31 weight limits.

32 Renumber existing paragraphs UR.3.4 through UR.3.12.)

33 **Previous Action:**

34 New

35 **Original Justification:**

36 OWM has noted a number of inquiries submitted to our office for explanation on the many and various issues involved
37 with the use of weighing or measuring devices as commercial devices when there is charge for doing so. Law
38 enforcement devices may be regulated in a different manner than commercial devices (e.g., allows highway weight
39 limit enforcement through multi-draft weighing) when commercial devices are not allowed to be used in that way.

40 The submitter pointed out that there seems to be a difference in opinions regarding this practice constitutes a
41 commercial transaction.

42 The submitter requested voting status for these items in 2022.

1 **Comments in Favor:**

2 **Regulatory:**

- 3 • Supported the language alignment of GEN 22.1 with L&R Block 2. Support for separating the blocked
4 items.

6 **Industry:**

- 7 • SMA provided written comments and open hearing testimony that the items should be separated.
8 Supports each item, but recommends changes to SCL 22.1

10 **Advisory:**

- 11 • NIST (submitter) recommended that GEN 22.1 be separated and given voting status. Asked that
12 remainder of block remain developing.

14 **Comments Against:**

15 **Regulatory:**

- 16 •

18 **Industry:**

- 19 •

21 **Advisory:**

23 **Neutral Comments:**

24 **Regulatory:**

- 25 • SCL code sections could be reworded for easier understanding and comprehension of commercial vs.
26 non-commercial.

28 **Industry:**

- 29 • Recommended that tickets should have identification of axle groups.

31 **Advisory:**

32 **Item Development:**

33 NCWM 2022 Interim Meeting: During the S&T Committee work session, the committee agreed to remove item GEN
34 22.1 from Block 6. The committee recommendations pertain to the remainder of the block only (SCL 22.1 & SCL
35 22.3). The committee received updated language from the submitter for item SCL 22.1.

36 This item has been assigned to the submitter for further development. For more information or to provide comment,
37 please contact:

38 Mr. Richard Harshman
39 NIST Office of Weights and Measures
40 301-975-8107, richard.harshman@nist.gov

41 **Regional Associations' Comments:**

42 WWMA 2021 Annual Meeting: Kurt Floren (LA County): He wants to offer that the last part of subsection A and
43 breaking into bullet points. He wants to break out equipment that is commercial, then the other types. It's titled
44 commercial and law enforcement then "other commercial" and it becomes confusing. Is it all commercial and subsect
45 to our jurisdiction? rephrase GA-1: apply "to commercial equipment as follows: " ... explains that everything under is
46 commercial. (strike "commercial" from A and B). Between apply and as in the first line, insert commercial equipment.
47 Kurt Floren stated that he will submit a written statement to the Committee as presented during open hearings. Ivan
48 Hankins (Iowa): He wants clarification as to what is being changed to make it better. It looks like it's already there,

1 and he wants more definition on why this is changing. Cadence Matijevich (Nevada): Agrees with Kurt but cautions
2 that we consider how the heading reads if we add commercial to the opening statement then there might be some
3 interpretation that what is or is not commercial law enforcement equipment. (is there a fine assessed?) does not want
4 to narrow the subsection of law enforcement devices only to commercial purposes. Kurt Floren (LA County): fix to
5 Cadence Matijevich: restructure under GA-1: insert subsection under 1: commercial as follows, then insert A,B,C
6 then 2 for law enforcement. Cadence Matijevich (Nevada) - states that Kurt is much better at this, and his fix is good.
7 Lou Straub (Fairbanks Scales): agrees with Ivan, that the original language is satisfactory. Language needs to say that
8 its NTEP approved and meet handbook requirements. Eric Golden (Cardinal Scale): does a commercial transaction
9 include just getting a weight: he says yes. Change the wording that that transaction is commercial. No suggestions at
10 this time. Kurt missed a typo: in B2: "Basis." Tina Butcher (NIST OWM); their office submitted this. Wanted to
11 clarify commercial transactions. Agrees with previous testimony. They have submitted other proposals to amend
12 method of sale reg. and uniform law. They have determined that HB44 and 2 sections in HB130 are slightly different.
13 Uniform Reg. for service persons also needs to be aligned. Wants this to remain developing so that they can continue
14 to align the language and make it more uniform. Russell Vires (Scale Manufacturers Association): This is a new item,
15 the SMA has not vetted this yet. They will do so at November meeting. This should remain developing so that there's
16 no unintended consequences. Tina Butcher (NIST OWM): In the agenda, this is blocked with two other "companions".
17 She feels that the block should continue, however, if others think that other items in the block are ready (SCL-22.1
18 and SCL-22.3) those items can move forward. Russell Vires (Scale Manufacturers Association): he is looking at it as
19 a block and is commenting as an entire block. Wants all 3 to remain developing so that they can research. Lou Straub
20 (Fairbank Scales): SCL-22.1: concern about the second sentence: talking about the entire truck on the scale = not
21 legal for trade: this is ok. Second part about axle identifications (axle groups) this gets difficult to identify group
22 notifications. Wants the ticket that has already been marked as not legal for trade to not have to identify all axels.
23 Wants this re-worded. They will put down axle weight and gross weight. Preprinted labels don't allow enough space.
24 Eric Golden (Cardinal Scales): agrees with Tina to split the items. "Blow the block apart." The second two items
25 introduce additional items and topics. Wants to pull the second two items out.

26 The WWMA S&T Committee recommends that this be assigned a Developmental status. The Committee recommends
27 following the submitter's request to remove GEN-22.1 from the Block. Based on testimony heard the Committee
28 agreed to submit the following language for item GEN-22.1. The Committee notes that SCL-22.1 (UR.3.3.) item was
29 reassigned as SCL-22.3.

30
31 **G-A.1. Commercial and Law-Enforcement Equipment.** – These specifications, tolerances, and other
32 technical requirements apply as follows:

33 **(1) To commercial weighing and measuring equipment**

34 (a) ~~To commercial weighing and measuring equipment; that is, to weights and measures and weighing and~~
35 ~~measuring devices commercially used or employed in establishing the size, quantity, extent, area,~~
36 ~~composition (limited to meat and poultry), constituent values (limited to grain), or measurement of~~
37 ~~quantities, things, produce, or articles for distribution or consumption, purchased, offered, or submitted~~
38 ~~for sale, hire, or award, or in computing any basic charge or payment for services rendered on the~~
39 ~~basis of weight or measure.~~

40 (Amended 2008 and 20XX)

41 (c) ~~To other commercial weighing and measuring equipment:~~
42 i. when there is a fee assessed for the use of the equipment to determine a weight or
43 measure;
44 ii. used to determine the bases of an award using count, weight, or measure; or
45 iii. used in computing any basic charge or payment for services rendered on the basis of weight
46 or measure

47 (Added 20XX)

48
49 (bc) To any accessory attached to or used in connection with a commercial weighing or measuring device
50 when such accessory is so designed that its operation affects the accuracy of the device.

1 ~~(ed)~~(2) To weighing and measuring equipment in official use for the enforcement of law or for the collection
2 of statistical information by government agencies.

3 (These requirements should be used as a guide by the weights and measures official when, upon request, courtesy
4 examinations of noncommercial equipment are made.)

5 SWMA 2021 Annual Meeting: Russ Vires, Mettler Toledo, stated that this item needs work on the wording and
6 further review by stakeholders. Its current language could have unintended consequences, and recommended it
7 continue with a Developing Status. This committee would like clarification on the purpose and use of axle weight
8 scale values allowed by this proposal beyond law enforcement use.

9
10 This committee recommends that this item move forward with a Developing status.

11 CWMA 2021 Interim Meeting: Loren Minnich-Kansas suggested change he sent to the committee (in green).

12 **B6: GEN-22.1 G-A.1. Commercial and Law-Enforcement Equipment.** – These specifications,
13 tolerances, and other technical requirements apply as follows:

14 (a) To commercial weighing and measuring equipment; that is, to weights and measures and weighing and
15 measuring devices commercially used or employed in establishing the size, quantity, extent, area,
16 composition (limited to meat and poultry), constituent values (limited to grain), or measurement of
17 quantities, things, produce, or articles for distribution or consumption, purchased, offered, or submitted
18 for sale, ~~hire, or award, or in computing any basic charge or payment for services rendered on the~~
19 ~~basis of weight or measure.~~

20 (Amended 2008 and 20XX)

21 (b) To other commercial weighing and measuring equipment:

22 i. when there is a fee assessed for the use of the equipment to determine a weight or
23 measure;

24 ii. used to determine the bases of an award using count, weight, or measure when using
25 weight, measure, or count as the basis to determine an award; or

26 iii. used in computing any basic charge or payment for services rendered on the basis
27 of weight or measure

28 (Added 20XX)

29 Loren Minnich-Kansas also asked NIST for clarification on G-A.1. because different states already interrupt rule
30 different ways. Diane Lee-NIST agreed with Loren and suggested it be developing. Eric Golden-Cardinal Scales
31 agrees with the spirit of the proposal; it is indeed a “commercial transaction” to charge a person a fee solely for the
32 purpose of obtaining a weight of a vehicle – it is not required to have to undergo a sales transaction of weighed product
33 in order for it to be considered a commercial transaction. Eric also recommended striking out the following (in red)
34 stating the reasoning behind this is by leaving the “non-commercial” language in the proposal, it defeats the purpose
35 of the proposal, which is to officially clarify what a non-commercial transaction is.

36 **B6: SCL-22.1 S.1.14. Recorded Representation of Axle or Axle Group Weights**

37 S.1.14. Recorded Representation of Axle or Axle Group Weights. – The recorded representation of
38 weights from individual axle or axle group weights shall clearly be identified as “not legal for trade”
39 or “non-commercial” weight values unless the entire vehicle is positioned on live elements of a multiple-
40 platform vehicle scale and where all axles/axle groups are weighed simultaneously. All recorded
41 weights of axles/axle groups shall be identified as representing only a portion of the vehicle’s total gross
42 weight (e.g., by axle groupings such as: “axle group 1,” “axle group 2,” “axle group 3,” or by individual
43 axle description such as: “steering axle,” “drive axles,” “trailer axles”).

44 Any total gross weight of the vehicle included in the recorded representations determined by summing axle
45 weights shall be clearly identified as “not-legal-for trade” or “non-commercial” unless those axle weights were

1 **recorded when all parts of the vehicle rested simultaneously on live portions of the scale, or the individual**
 2 **components were uncoupled, positioned completely on the live elements, and weighed separately on the scale.**

3 Tina Butcher-NIST agreed G-A.1. needed more work and had no objection to Eric Golden suggestion of splitting
 4 SCL-22.1 and SCL-22.3. Lou Straub-Fairbanks says current G-A.1. is already correct. He also agreed with Eric
 5 Golden from Cardinal Scales on SCL 22.1. Doug Musick-Kansas agreed with Lou Straub. Says that item is not
 6 practical for all vehicles out there. Keep as developing. Ivan Hankins-Iowa feels G-A.1. is already correct. Charles
 7 Stutesman-Kansas stated original language is good as written.

8 CWMA S&T Committee recommends that GEN 22.1 be withdrawn and SCL-22.1 and SCL 22.3 remain developing.

9 NEWMA 2021 Interim Meeting:

10 GEN-22.1

11 Rick Harshman (NIST OWM) commented that the language is in-need of some changes and NIST will be providing
 12 changes for the NCWM. Eric Golden (Cardinal Scale) supports the intent of this item, but it may need some
 13 wordsmithing. Lou Straub (SMA) Cheryl Ayer (New Hampshire) and John McGuire (New Jersey) all support this as
 14 a developing item.

15 SCL 22.1

16 Eric Golden (Cardinal Scale) supports this item moving forward as developing. Lou Straub (Fairbanks Scale) agrees
 17 with language in general. But questions the benefit of including all the language on a scale ticket and the large amount
 18 of information would be difficult to fit on the ticket. Eric Golden (Cardinal Scale) and Cheryl Ayer (New Hampshire)
 19 agree with comments from Mr. Straub. John McGuire (New Jersey) recommends keeping this item in developing
 20 status.

21 SCL 22.3r

22 Eric Golden (Cardinal Scale) suggested to strike “non-commercial” and additional wordsmithing to align with
 23 paragraph UR3.4. John McGuire (New Jersey) supports keeping this item in developing status.

24 The NEWMA Specifications and Tolerances Committee recommends that this item be given a Developing Status.

CWMA Report: B6: SCL-22.3	
Regional recommendation to NCWM on item status:	
<input type="checkbox"/> Recommend as a Voting Item on the NCWM agenda <input type="checkbox"/> Recommend as an Information Item on the NCWM agenda <input type="checkbox"/> Recommend as an Assigned Item on the NCWM agenda <i>(To be developed by an NCWM Task Group or Subcommittee)</i> <input checked="" type="checkbox"/> Recommend as a Developing Item on the NCWM agenda <i>(To be developed by source of the proposal)</i> <input type="checkbox"/> Recommend Withdrawal of the Item from the NCWM agenda <i>(In the case of new proposals, do not forward this item to NCWM)</i> <input type="checkbox"/> No recommendation from the region to NCWM <i>(If this is a new proposal, it will not be forwarded to the national committee by this region)</i>	
Comments and justification for the regional recommendation to NCWM: (This will appear in NCWM reports)	
Jan Konijnenburg – NIST OWM – This proposal has been amended and items are in developing status. Soliciting additional feedback from the community for each item in Block 6.	
Russ Vires – SMA - The SMA supports the intent of this item, and believes that additional work is necessary.	
The CWMA S&T Committee recommends this item remain in developing status per the submitter’s request.	

1 Additional letters, presentation and data may have been submitted for consideration with this item. Please refer to
 2 <https://www.ncwm.com/publication-16> to review these documents.

3 **BLOCK 7 ITEMS (B7) TOLERANCES ON TESTS USING TRANSFER STANDARDS**

4 **Source:**
 5 Seraphin Test Measure Company, A Division of Pemberton Fabricators, Inc.

6 **Purpose:**
 7 The purpose of these proposals is to change the language in the tolerance paragraphs that already specify that larger
 8 tolerances when a transfer standard is used, but that the OIML R117 Reduced MPE formula shall be used. Unless the
 9 proposed changes to 2021 S&T Agenda Block 1 Item GEN-19.1. are accepted, these proposals should not proceed.

10 **B7: CLM-22.1 D T.3. On Tests Using Type 2 Transfer Standards.**

11 **Item Under Consideration:**
 12 Amend Handbook 44, Cryogenic Liquid-Measuring Devices Code as follows:

13 **T.3. On Tests Using Type 2 Transfer Standards.** – ~~To the basic tolerance values that would otherwise be~~
 14 ~~applied, there shall be added an amount equal to two times the standard deviation of the applicable transfer~~
 15 ~~standard when compared to a basic reference standard.~~ **When commercial meters are tested using a Type 2**
 16 **transfer standard, the tolerance applied to the meter under test shall be calculated using the formula**
 17 **specified in the General Code Tolerance section.**
 18 **(Amended 202X)**

CWMA Report: B7: CLM-22.1
<p>Regional recommendation to NCWM on item status:</p> <p> <input checked="" type="checkbox"/> Recommend as a Voting Item on the NCWM agenda <input type="checkbox"/> Recommend as an Information Item on the NCWM agenda <input type="checkbox"/> Recommend as an Assigned Item on the NCWM agenda <i>(To be developed by an NCWM Task Group or Subcommittee)</i> <input type="checkbox"/> Recommend as a Developing Item on the NCWM agenda <i>(To be developed by source of the proposal)</i> <input type="checkbox"/> Recommend Withdrawal of the Item from the NCWM agenda <i>(In the case of new proposals, do not forward this item to NCWM)</i> <input type="checkbox"/> No recommendation from the region to NCWM <i>(If this is a new proposal, it will not be forwarded to the national committee by this region)</i> </p>
<p>Comments and justification for the regional recommendation to NCWM: <i>(This will appear in NCWM reports)</i></p> <p>Bob Murnane – Seraphin - Remain developing, can't move to voting item unless OTH-22.1 does move to voting.</p> <p>The CWMA S&T Committee recommends this moves forward as a voting item, with the understanding that Block 8 must first pass.</p>

19

20 **B7: CDL-22.1 D T.3. On Tests Using Type 2 Transfer Standards.**

21 **Item Under Consideration:**
 22 Amend Handbook 44, Carbon Dioxide Liquid-Measuring Devices Code as follows:

1 **T.3. On Tests Using Type 2 Transfer Standards.** – ~~To the basic tolerance values that would otherwise be~~
 2 ~~applied, there shall be added an amount equal to two times the standard deviation of the applicable transfer~~
 3 ~~standard when compared to a basic reference standard.~~ **When commercial meters are tested using a Type 2**
 4 **transfer standard, the tolerance applied to the meter under test shall be calculated using the formula**
 5 **specified in the General Code Tolerance section.**
 6 **(Amended 202X)**

CWMA Report: B7: CDL-22.1	
Regional recommendation to NCWM on item status:	
<input checked="" type="checkbox"/> Recommend as a Voting Item on the NCWM agenda <input type="checkbox"/> Recommend as an Information Item on the NCWM agenda <input type="checkbox"/> Recommend as an Assigned Item on the NCWM agenda <i>(To be developed by an NCWM Task Group or Subcommittee)</i> <input type="checkbox"/> Recommend as a Developing Item on the NCWM agenda <i>(To be developed by source of the proposal)</i> <input type="checkbox"/> Recommend Withdrawal of the Item from the NCWM agenda <i>(In the case of new proposals, do not forward this item to NCWM)</i> <input type="checkbox"/> No recommendation from the region to NCWM <i>(If this is a new proposal, it will not be forwarded to the national committee by this region)</i>	
Comments and justification for the regional recommendation to NCWM: <i>(This will appear in NCWM reports)</i>	

7 **B7: HGM-22.1 D T.4. Tolerance Application on Tests Using Type 2 Transfer Standard Test**
 8 **Method.**

9 **Item Under Consideration:**

10 Amend Handbook 44, Hydrogen Gas-Measuring Devices Code as follows:

11 **T.4. Tolerance Application on Tests Using Type 2 Transfer Standard Test Method.** – ~~To the basic~~
 12 ~~tolerance values that would otherwise be applied, there shall be added an amount equal to two times the~~
 13 ~~standard deviation of the applicable transfer standard when compared to a basic reference standard.~~ **When**
 14 **commercial meters are tested using a Type 2 transfer standard, the tolerance applied to the meter under**
 15 **test shall be calculated using the formula specified in the General Code Tolerance section.**
 16 **(Amended 202X)**

17 **Previous Action:**

18 New

19 **Original Justification:**

20 In the codes mentioned above, when transfer standards are used, the basic tolerances to be applied to the devices under
 21 test are to be increased by the uncertainty of the transfer standard (i.e., two times the standard deviation of the transfer
 22 standard). The proposed changes incorporate the OIML R117 formula to state how the tolerance is to be increased
 23 when transfer standards are used. The formula effectively places an upper limit on how large the uncertainty
 24 associated with the transfer standard can be.

25 The current paragraphs already state that, when transfer standards are used, the tolerances are to be increased by two
 26 standard deviations for the repeatability of the transfer standard. One can argue that effect of the proposed changes is
 27 small and not necessary. The proposed changes are intended to provide consistency with the changes proposed in the
 28 amended proposals of 2021 S&T Agenda Block 1 Item GEN-19.1.

1 The submitter requested that this be a Voting Item in 2022.

2 **Comments in Favor:**

3 **Regulatory:**

- 4 •

5 **Industry:**

- 6 • Bob Murnane (Seraphin) explained the addition of “Type 2” term.

7 **Advisory:**

- 8 •

9 **Comments Against:**

10 **Regulatory:**

- 11 •

12 **Industry:**

- 13 • A revised version by Seraphin (submitter) was presented and made available on the NCWM website to
 14 properly align with GEN 19.1. The submitter requests that Block 7, Gen 19.1 and related item OTH
 15 21.1 follow the same path moving forward.
 16 • Dmitri Karimov (Liquid Controls) commented that the Block is linked to GEN 19.1 due to definition
 17 of Type 1 and 2 transfer standards. Mr. Karamov said it seems odd to single out Type 2. He explained
 18 T.1-3 restates what’s in GEN 19.1 and recommends the Block to be withdrawn and GEN 19.1 move
 19 forward.

20 **Advisory:**

- 21 •

22 **Neutral Comments:**

23 **Regulatory:**

- 24 • Matt Douglas (California) recommends this Block and the associated items be given developing status.

25 **Industry:**

- 26 • Dmitri Karimov representing the Meter Manufacturers Association (MMA) stated that there was no
 27 consensus within the MMA.

28 **Advisory:**

- 29 • Diane Lee (NIST, OWM) who provided a brief overview of the written NIST analysis, which can be
 30 found on the NCWM website. This item is related to GEN 19.1 and OTH 22.1.

31 **Item Development:**

32 NCWM 2022 Interim Meeting: The committee recommended that this item be given a developing status to allow the
 33 submitter to work on it. Since the 2022 interim meeting, the submitter has made additional changes to the items under
 34 consideration which are currently reflected in Block 7 above. These changes reference using the specific formula in
 35 the general code tolerance section, rather than a formula specified here.

36 **Regional Associations’ Comments:**

37 WWMA 2021 Annual Meeting: Bob Murnane (Seraphin): submitter: this needs to go with the GEN-19. Marc Buttler
 38 (Emerson Micro Motion): wants to re-state : earlier comment on GEN item would also apply to calculation on this.
 39 He will adjust the calculation to increasing tolerance from decreasing. Bob Murnane (Seraphin): they have looked at

1 original comments in GEN 19: they will have info for us shortly. A letter was submitted to the Committee by Marc
2 Buttler (Emerson Micro Motion) and will be posted to the WWMA website.

3 The WWMA S&T Committee recommends that this Block be assigned a developmental status. The Committee
4 recommends that item GEN-19.1 be inserted into Block 7.

5 SWMA 2021 Annual Meeting: Mr. Oppermann, Seraphin, stated that this item is related to Gen 19.1, and should not
6 move forward unless Gen 19.1 moves forward as well.

7 This committee recommends this item be assigned Developing status.

8 CWMA 2021 Interim Meeting: Dr. Henry Opperman- Weights and Measures Consultants stated that if GEN 19.1
9 were to pass then CLM 22.1 and CDL 22.1 would need to be voted on as well. Tina Butcher-NIST Thinks original
10 formula is correct, where as modified formula would not put a limit. Believes it needs more work. Robert Murnane-
11 Seraphin recommended that the item stay as developing and be combined with GEN 19.1.

12
13 CWMA S&T Committee recommends that the item be developing.

14 NEWMA 2021 Interim Meeting: Henry Opperman (Seraphin) commented with clarification from Bob Murnane
15 (Seraphin) that this item is in conjunction with Gen 19 and with the changes outlined in Gen 19 (see comments) He
16 recommends this item to be forwarded as a developing item.

17 The NEWMA Specifications and Tolerances Committee recommends that this item be given a Developing Status.

CWMA Report: B7: HGM-22.1
Regional recommendation to NCWM on item status:
<input checked="" type="checkbox"/> Recommend as a Voting Item on the NCWM agenda <input type="checkbox"/> Recommend as an Information Item on the NCWM agenda <input type="checkbox"/> Recommend as an Assigned Item on the NCWM agenda <i>(To be developed by an NCWM Task Group or Subcommittee)</i> <input type="checkbox"/> Recommend as a Developing Item on the NCWM agenda <i>(To be developed by source of the proposal)</i> <input type="checkbox"/> Recommend Withdrawal of the Item from the NCWM agenda <i>(In the case of new proposals, do not forward this item to NCWM)</i> <input type="checkbox"/> No recommendation from the region to NCWM <i>(If this is a new proposal, it will not be forwarded to the national committee by this region)</i>
Comments and justification for the regional recommendation to NCWM: <i>(This will appear in NCWM reports)</i>

18
19 Additional letters, presentation and data may have been submitted for consideration with this item. Please refer to
20 <https://www.ncwm.com/publication-16> to review these documents.

21 **BLOCK 8 ITEMS (B8) TOLERANCES ON TESTS USING TRANSFER STANDARDS,**
22 **APPENDIX A - TOLERANCES FOR STADARDS, AND**
23 **APPENDIX D – FIELD STANARDS AND TRANSFER**
24 **STANDARDS**

25 *Note: These proposals are a combined modification of the 2021 S&T Agenda Block 1 Items GEN-19.1 and*
26 *OTH-22.1. Since the S&T Committee has changed item GEN-19.1 from “assigned” to “developing,” the*

1 *submitter has worked with NIST OWM to revise and combine the original proposals of GEN-19.1 and OTH-*
 2 *22.1 to address discussions within the NCWM Field Standards Task Group and other comments received*
 3 *at the regional weights and measures meetings on the proposals. These items are related, so they are*
 4 *presented together. These OWM and Seraphin proposals were submitted to the S&T Committee just before*
 5 *the 2022 Interim Meeting.*

6 *Note: The OWM and Seraphin proposals submitted to the S&T Committee just before the 2022 Interim*
 7 *Meeting were updated with two changes at the request of the Submitters following the 2022 Interim*
 8 *Meeting. The first change is in the definition of “Standard, Field.” The words “(typically one year)” were*
 9 *replaced with “(as determined by the Director)”. The second change was to add the words “to the*
 10 *International System of Units (SI)” in the section 3.1.3. of the Fundamental Considerations. These two*
 11 *changes are reflected in the items below.*

12 **Source:**

13 Seraphin Test Measure Company (GEN-19.1) and NIST, Office of Weights and Measures (OTH-22.1)

14 **Purpose:**

- 15 (a) Add a tolerance statement to the General Code that applies whenever a Type 2 transfer standard is used;
- 16 (b) Clarify in the Fundamental Considerations (Appendix A of Handbook 44) that the authority to approve field
 17 test standards rests with the regulatory official and that specific types of field test standards need not be
 18 identified in the body of a Handbook 44 Code in order to be approved by the weights and measures director;
- 19 (c) Add text to Section 3.2. Tolerances for Standards of the Fundamental Considerations (Appendix A of
 20 Handbook 44) to recognize the wide range of transfer standards already recognized in Handbook 44, explain
 21 the critical differences between field standards and transfer standards, and to specify the formula to be used
 22 to calculate the device tolerance when the uncertainty of the transfer standard exceeds the one-third
 23 requirement; and
- 24 (d) Add definitions to Appendix D of Handbook 44 for field standard and Type 1 and Type 2 transfer standards
 25 that identify the critical characteristics for field and transfer standards.

26 **B8: GEN-19.1 D G-T.5. Tolerances on Tests When Transfer Standards are Used., Appendix**
 27 **A, Section 3.2. Tolerances for Standards., and Appendix D – Definitions:**
 28 **standards, field., ~~transfer standard.~~ and standard, transfer.**

29 **Item Under Consideration:**

30 Amend Handbook 44, General Code as follows:

31 **G-T.5. Tolerances on Tests When Type 2 Transfer Standards Are Used. – When Type 2 transfer**
 32 **standards are used, the following formula shall be used to compute the tolerance applicable to the**
 33 **device under test:**

34 **Increased MPE = (2/3 x MPE + U)**

35 **with an upper limit of U_{MAX} = 2/3 MPE**

36 **Where MPE is the basic tolerance that applies when using a basic reference standard; and**

37 **U = uncertainty associated with the Type 2 transfer standard.**

The increase in the applied tolerance when using a Type 2 transfer standard applies only to the basic tolerances for devices as defined in Handbook 44; that is acceptance, maintenance and minimum tolerances. Note that the repeatability tolerance and the special test tolerances are NOT increased.

Codes 5.56.(a) Grain Moisture Meters, 5.56.(b) Grain Moisture Meters, and 5.57. Near-Infrared Grain Analyzers are exempt from this requirement because NIST Handbook 159 has requirements for monitoring and retesting grain samples to ensure adequate stability and the tolerances for the devices under test already incorporate the uncertainty associated with the use of grain samples as transfer standards. The code 2.21. Belt-Conveyor Scale Systems Code is also exempt because relative and absolute tolerances are included in the code.

Amend Handbook 44 Appendix D – Definitions as follows.

Standard, Field. – A physical artifact, static or dynamic measurement device or a reference material that (a) meets the requirements of the Fundamental Considerations, Section 3.2., (b) is stable (accurate and repeatable) over an extended period of time (as determined by the Director), (c) is valid (corrections that may be used) over the range of environmental and operational parameters in which the commercial measuring devices are used, and (d) is traceable to the reference or working standards through comparisons, using acceptable laboratory procedures. [3.34, 3.38, 3.39, x.xx, x.xx...]
(Added 202X)

~~**transfer standard. – A measurement system designed for use in proving and testing cryogenic liquid measuring devices. [3.38]**~~

Standard, Transfer, Type 1 and Type 2. – A physical artifact, static or dynamic measurement device or a reference material that is proven to be stable (accurate and repeatable) for a short time under the limited environmental and operational conditions during which the transfer standard is used. A Type 1 transfer standard is a transfer standard that meets the one-third accuracy requirement for a short time over a limited range of environmental conditions and/or a limited range of operating conditions in which it is used. A Type 2 transfer standard is one that does not meet the one-third requirement and may not be stable or valid over an extended time period or over wide ranges of environmental or operating conditions. (3.34, 3.38, 3.39, x.xx, x.xx...]
(Added 202X)

CWMA Report: B8: GEN-19.1

Regional recommendation to NCWM on item status:

- Recommend as a Voting Item on the NCWM agenda
- Recommend as an Information Item on the NCWM agenda
- Recommend as an Assigned Item on the NCWM agenda
(To be developed by an NCWM Task Group or Subcommittee)
- Recommend as a Developing Item on the NCWM agenda
(To be developed by source of the proposal)
- Recommend Withdrawal of the Item from the NCWM agenda
(In the case of new proposals, do not forward this item to NCWM)
- No recommendation from the region to NCWM
(If this is a new proposal, it will not be forwarded to the national committee by this region)

Comments and justification for the regional recommendation to NCWM: *(This will appear in NCWM reports)*

Bob Murnane – Seraphin - Transfer standard is already included in HB44 but it isn't defined. This doesn't preclude the ability for The Director to approve transfer standards. HB44 doesn't specify the frequency of testing intervals; cast iron vs stainless steel weights as an example. G.UR.4.1 already states the owner or operator must maintain the equipment, which includes the accuracy. States have different interval requirements. Recommends moving to a voting item.

Jan Konijnenburg – NIST OWM - State and industry have a need to use various types of test standards to evaluate commercial devices installed in the marketplace. NIST OWM recognizes the need to use various standards to test commercial devices and support the use of these standards when test data supports its use.

Block 8 clarifies the use and definition of three types of standards to be included in NIST HB 44: (1) Fields Standards, (2) Type 1 Transfer Standards and (3) Type 2 Transfer Standards; it provides an equation that should be used to calculate the tolerances when Type 2 transfer standards are used; provides definitions for Field Standards, Type 1 Transfer Standards and Type 2 Transfer Standards, and provides clarification that the State Director has the authority to approve the use of standard and that specific requirements in NIST HB 44 code are not necessary to approve a standard for use.

Two items, LPG-15.1 and MFM-15.1 in the Interim Meeting Report (Publication 16), include a purpose statement that the proposals are added to allow field standard meters to be used to test and place into service dispensers and delivery system flow meters. Block 8 items clarify what has always been recognized in NIST HB 44 concerning the responsibility for acceptance of a standard and notes that specific code changes are not necessary for a field standard to be adequate for use.

In addition to the changes in Block 8, a new form 15 for the 2023 cycle which is not included in the 2022 Publication 16 and has not been addressed separately in the 2022 NIST OWM Technical Analysis but has been circulated to the Spring 2022 Regional Associations (NEWMA and CWMA)

This new Form 15 adds a General Code requirement so that rather than revising a specific code in Handbook 44 every time a new field or transfer standard is proposed or developed, an overall statement in the General Code recognizes the use of other field and transfer standards that meet the requirements for use as field or transfer standards. The proposal is as follows:

G-N.3. Test Methods. – Permissible test methods for verifying compliance of weighing and measuring systems with the provisions of the General Code and Specific Codes include, but are not limited to, test methods and apparatus that have been approved by the State Director of weights and measures as outlined in Appendix A - Fundamental Considerations, Section 3. Testing Apparatus.

NIST OWM also observed that the definitions in Block 8 should include appropriate references to the NIST HB 44 codes.

OWM Recommendation: The submitters agree that these items, GEN-19.1 and OTH-22.1 are fully developed and requested that this S&T committee consider that Block 8 item be a Voting Item in 2023.

Charlie Stutesman – KS – GEN-19.1 line 29 – strike “as determined by the Director”
“short term” and “extended term” are ambiguous phrases.

Loren Minich – KS – Page 277 line 41 regarding a Type 2 transfer standard not being stable or valid over extended time, but OTH-22.1 page 279 line 28 says the Type 2 standard must be stable and valid. Mr. Minich would like to keep as developing.

Doug Musick – KS - Page 277 definitions: having the 1/3 rule in the code (and not in an appendix) is helpful. Suggested that Type 2 should go away and just have a single “transfer standard” definition.

Michael Keilty – Endress+Hauser – “Short term”, “extended period of time”, “short period of time”, “stable”, “valid” are arbitrary; who defines this? Who is going to establish this time period and qualifications of devices? Are we establishing a program for that? API chapter 4.8 dictates 5 year calibration intervals for small volume provers, for example.

The CWMA S&T Committee recommends this moves forward as a voting item.

1 **B8: OTH-22.1 D Appendix A: Fundamental Considerations, 3. Testing Apparatus**

2 **Item Under Consideration:**

3 Amend Handbook 44, Appendix A: Fundamental Considerations as shown below. Delete Footnote 2 referenced in
4 Section 3. Testing Apparatus of NIST Handbook 44 Appendix A, Fundamental Considerations, moving portions of

1 the footnote into Section 3.1 as part of the proposed changes to Section 3.1 shown above. Note that no changes are
2 proposed to Footnote 1.

3 ~~²Recommendations regarding the specifications and tolerances for suitable field standards may be
4 obtained from the Office of Weights and Measures of the National Institute of Standards and Technology.
5 Standards will meet the specifications of the National Institute of Standards and Technology Handbook
6 105-Series standards (or other suitable and designated standards). This section shall not preclude the use
7 of additional field standards and/or equipment, as approved by the Director, for uniform evaluation of
8 device performance.~~

9 **3.1. Adequacy.**² – Tests can be made properly only if, among other things, adequate testing apparatus is available.
10 Testing apparatus may be considered adequate only when it is properly designed for its intended use, when it is
11 so constructed that it will retain its characteristics for a reasonable period under conditions of normal use, when
12 it is available in denominations appropriate for a proper determination of the value or performance of the
13 commercial equipment under test, and when it is accurately calibrated.

14 **3.1.1. Essential Elements of Traceability. To ensure that field test standards and test methods**
15 **provide for measurements that are traceable to the International System of Units (SI), through NIST**
16 **or other National Metrology Institutes, they must satisfy the “Essential Elements of Traceability.” As**
17 **explained in NIST IR6969 GMP-13 Good Measurement Practice for Ensuring Metrological**
18 **Traceability, these elements include the following.**

- 19 • **Realization of SI Units**
- 20 • **Unbroken Chain of Comparisons**
- 21 • **Documented Calibration Program**
- 22 • **Documented Measurement Uncertainty**
- 23 • **Documented Measurement Procedure**
- 24 • **Accredited Technical Competence**
- 25 • **Measurement Assurance**

26 **3.1.2. Specifications for Standards. Standards will meet the specifications of the National Institute**
27 **of Standards and Technology Handbook 105-Series standards or other appropriate designated**
28 **documentary standards (e.g., ASTM, ASME, etc.). Recommendations regarding the specifications and**
29 **tolerances for suitable field standards may be obtained from the Office of Weights and Measures of**
30 **the National Institute of Standards and Technology.**

31 **3.1.3. Authority for Approving Field Test Standards and/or Equipment. This section shall not**
32 **preclude the use of additional field standards and/or equipment, as approved by the Director, for**
33 **uniform evaluation of device performance. Specific types of field test standards are not required to be**
34 **identified in a NIST Handbook 44 code in order to be considered suitable. Provided the standards**
35 **meet the “Essential Elements of Traceability” (described in Section 3.1.1. above) that help ensure the**
36 **standards are suitable and capable of supporting measurements traceable to the International System**
37 **of Units (SI) through NIST or other National Metrology Institutes, they need only be approved by the**
38 **Director.**

39 **3.2. Tolerances for Standards.** – Except for work of relatively high precision, it is recommended that the
40 accuracy of **field** standards used in testing commercial weighing and measuring equipment be established and
41 maintained so that the use of corrections is not necessary. When the **field** standard is used without correction, its
42 combined error and uncertainty must be less than one-third of the applicable device tolerance.

43 Device testing is complicated to some degree when corrections to standards are applied. When using a correction
44 for a standard, the uncertainty associated with the corrected value must be less than one-third of the applicable
45 device tolerance. The reason for this requirement is to give the device being tested as nearly as practicable the
46 full benefit of its own tolerance.

47 **Whenever possible and practical, field standards should be used to test commercial devices. However,**
48 **where it is impractical or unduly cumbersome to use field standards, transfer standards may be used.**

1 There are two categories of transfer standards. The critical criteria that distinguish between these
 2 standards are: (1) the accuracy and uncertainty of the standard; (2) the stability as a standard over an
 3 extended period; and (3) proven validity or performance of the standard over the range of environmental
 4 and operational conditions in which the standard may be used.

5 A “field standard” is one that meets the one-third requirement mentioned earlier in this section.
 6 Additionally, the field standard maintains its validity or stability as a standard over an extended period
 7 (defined based on data of the standard’s stability by an authorized metrology lab or as specified by the
 8 Director) and is known to maintain its value as a standard over the full range of environmental conditions
 9 and the range of operating conditions in which the standard may be used to test commercial weighing and
 10 measuring devices. Corrections, as documented by an authorized metrology laboratory, may be used.

11 Transfer standards do not meet one or more of these critical criteria. One category of transfer standards,
 12 which is referred to here as a “Type 1 transfer standard,” is a transfer standard that meets the one-third
 13 accuracy requirement for a short time, under a limited range of environmental conditions and/or a limited
 14 range of operating conditions. The accuracy of a Type 1 transfer standard may have to be verified through
 15 testing each time it is used to verify that the desired accuracy and performance can be achieved when the
 16 Type 1 transfer standard is used under the limited environmental and operating conditions. When a Type
 17 1 transfer standard is used, the basic tolerances specified for the commercial measuring devices are applied
 18 as specified in the applicable codes.

19 The second category of transfer standard, which is referred to here as a “Type 2 transfer standard,” is one
 20 that does not meet the one-third requirement. The Type 2 transfer standard must be stable and valid under
 21 the environmental or operating conditions in which it is used. The performance characteristics must be
 22 confirmed with sufficient data to properly characterize the uncertainty associated with the Type 2 transfer
 23 standard. When a Type 2 transfer standard is used, the tolerances applicable to the commercial weighing
 24 and measuring device must be increased to recognize the large uncertainty or corrections associated with
 25 the Type 2 transfer standard. When commercial meters are tested using a Type 2 transfer standard, the
 26 tolerance applied to the meter under test shall be determined as specified in the General Code.

27 (Added 202X)

28 **3.3. Accuracy of Field Standards.** – Prior to the official use of testing apparatus, its accuracy should invariably
 29 be verified. Field standards should be calibrated as often as circumstances require. By their nature, metal
 30 volumetric field standards are more susceptible to damage in handling than are standards of some other types. A
 31 field standard should be calibrated whenever damage is known or suspected to have occurred or significant repairs
 32 have been made. In addition, field standards, particularly volumetric standards, should be calibrated with
 33 sufficient frequency to affirm their continued accuracy, so that the official may always be in an unassailable
 34 position with respect to the accuracy of his testing apparatus. Secondary field standards, such as special fabric
 35 testing tapes, should be verified much more frequently than such basic standards as steel tapes or volumetric
 36 provers to demonstrate their constancy of value or performance.

37 Accurate and dependable results cannot be obtained with faulty or inadequate field standards. If either the service
 38 person or official is poorly equipped, their results cannot be expected to check consistently. Disagreements can
 39 be avoided and the servicing of commercial equipment can be expedited and improved if service persons and
 40 officials give equal attention to the adequacy and maintenance of their testing apparatus.

41 **Background and Discussion:**

42 NCWM 2022 Interim Meeting Item GEN-19.1 was assigned to the original submitter, Seraphin, for further
 43 development. As noted at the beginning of this item Seraphin has worked with NIST OWM to revise and combine
 44 the original proposals of GEN-19.1 and OTH-22.1. Consequently, NIST OWM has asked that OTH-22.1 be combined
 45 with GEN-19.1. For more information or to provide comment, please contact:

1 Mr. Robert Murnane
2 Seraphin Test Measure Company
3 A Division of Pemberton Fabricators, Inc.
4 609-267-0922, rmurnane@pemfb.com
5 or

6 Ms. G. Diane Lee
7 NIST Office of Weights and Measures
8 diane.lee@nist.gov

9 The submitter of the original GEN 19.1 provided the following:

10 Over the last several years, there have been, and still are, proposals to recognize some types of meters as either transfer
11 standards or as field standards. Handbook 44 already recognizes the use of many different types of master meters,
12 other reference materials, or devices as transfer standards. This proposal is based upon the existing recognition and
13 permitted use of transfer standards that are already in Handbook 44.

14 However, there is no common understanding among industry and weights and measures officials as to what
15 distinguishes a field standard from a transfer standard. Consequently, changes are proposed to the Fundamental
16 Considerations Section 3.2. and definitions are proposed for field standards and transfer standards to highlight the
17 critical differences between these two types of standards. Any artifact, reference material or measuring device that
18 meets the requirements of accuracy and repeatability as specified in Section 3.2. of the Handbook 44 Fundamental
19 Considerations qualifies as a field standard. However, what has not been clearly understood is that **the field standard**
20 **must meet Section 3.2. over the environmental and operational parameters in which the commercial measuring**
21 **devices under test are used.** The ranges for these environmental and operational parameters may be very large and
22 include:

- 23 • The range of flow rates at which the commercial meters under test operate (from the minimum to maximum
24 flow rates for the meters);
- 25 • The range of air temperatures over which meters are used (perhaps 10° F to 105° F);
- 26 • The range of product temperatures over which meters are used (perhaps 10° F to 105° F, especially applicable
27 for above ground storage tanks);
- 28 • The range of temperature differences that may exist between the product, the standard and the air over which
29 meters are used (perhaps up to 50° F, especially for cold fuel in underground tanks and hot air temperatures);
- 30 • The range of pressures at which the pumping systems operate at different times and locations;
- 31 • The different products measured by similar meters; and
- 32 • Tests of multiple “standards” of the same type when used in different test system configurations (and
33 “standards” of different sizes) to verify that the results agree and are consistent.

34 A range of environmental and operational parameters over which a transfer standard must meet the accuracy and
35 repeatability requirements are more limited, that is, a transfer standard need only be accurate and repeatable over the
36 conditions that exist for the “short” time that the transfer standard is used. Transfer standards may be tested before
37 and after use to verify a commercial measuring device, so the range of conditions in which accuracy and repeatability
38 may be relatively small. The transfer standard is only required to be accurate and repeatable during the time it is in
39 use, which might be to test only one commercial device. For example:

- 40 • The range of flow rates at which the meters under test operate **at the time of the test;**
- 41 • The range of air temperatures that exist **at the time of the test;**
- 42 • The range of product temperatures that exist **at the time of the test;**
- 43 • The range of temperature differences that may exist between the product, the standard and the air **at the time**
44 **of the test;**
- 45 • The range of pressures at which the pumping systems operate **at the time of the test;** and
- 46 • The product being measured by the meter **at the time of the test.**

1 A critical issue that has not be adequately addressed and defined is, “How long must a field standard remain valid
 2 (i.e., accurate and repeatable)?” Common sense dictates that the field standard must remain valid over an extended
 3 period of time. Transfer standards need only remain valid during their “short” period of use. Because (1) there are
 4 some many different types of field standards used to test commercial measuring devices, (2) there are so many transfer
 5 standards recognized in Handbook 44, and (3) the applications vary greatly, it isn’t clear that a common minimum
 6 time period for field standards or for transfer standards can be established. Nevertheless, field standards must be valid
 7 and stable over long time periods and wide ranges of environmental and operational parameters as compared to transfer
 8 standards.

9 Additionally, transfer standards do not have to meet the one-third requirement for the uncertainty associated with its
 10 performance. Consequently, Handbook 44 typically specifies that the basic tolerances to be applied to the device under
 11 test be increased by two times the standard deviation of the transfer standard. This presumes that the transfer standard
 12 has been adjusted to have “zero error” or corrections are used to address any significant systematic errors in the transfer
 13 standard. This also applies when field standards are used. “The reason for this requirement is to give the device being
 14 tested as nearly as practicable the full benefit of its own tolerance.”¹

15 The submitter also provided the following possible opposing arguments:

- 16 I. There are several proposals before the S&T Committee to recognize some meters as field standards and field
 17 standard reference meters. These proposals have not specified how the proposed field standards are to be tested
 18 to demonstrate compliance with the Fundamental Considerations requirements of Section. 3.2. It is possible
 19 that some companies will push for the recognition of meters as field standards without submitting data to
 20 support their claims of performance as field standards.
- 21 II. It is very difficult, time consuming and expensive to test meters that are proposed for use as field standards,
 22 especially to test using different fuels over the range of temperatures that exist for commercial applications and
 23 for temperature differences between the fuel and the air. It is possible that some will object to having to prove
 24 meter performance over the range of environmental and operational parameters.
- 25 III. It is possible that some companies will want to use performance data collected under laboratory conditions as
 26 being indicative of the expected performance of the meters under field conditions.
- 27 IV. Laboratory calibration procedures may not reflect the performance of the proposed field standard under field
 28 conditions.
- 29 V. Some companies may object to the cost of collecting data for transfer standards (meters) of different sizes and
 30 with different flow rate ranges to prove that the results for the different sized transfer standards (metering
 31 systems) will produce consistent test results on the same commercial meters.
- 32 VI. Establishing a reasonably good estimate of the standard deviation associated with a transfer standard (to be
 33 added to the basic tolerances for the devices under test) may require significant time, effort and cost.
- 34 VII. Some companies may want to modify the device under test to be able to test the commercial measuring device,
 35 rather than testing the device as used.

36 The submitter states that these items are fully developed and requested that this be a Voting Item in 2022.

37 **Background and Discussion for Item OTH-22.1 originally submitted by NIST Office of Weights and Measures.**

38 **Source:**
 39 NIST, Office of Weights and Measures

¹ Handbook 44, Fundamental Considerations, Section 3.2.

1 **Previous Action:**

2 New

3 **Original Justification:**

4 Footnote 2 of Handbook 44, Appendix A, Fundamental Considerations, Section 3. Testing Apparatus was added to:

- 5 (1) specify recommendations for suitable field test standards;
- 6 (2) require that field test standards meet specifications in Handbook 105 Series or other appropriate documentary
- 7 standards; and
- 8 (3) note that guidance may be obtained from NIST OWM regarding appropriate specifications, tolerances, and
- 9 other criteria for assessing the suitability of a field test standard for use in inspecting and testing commercial
- 10 weighing and measuring equipment.

11

12 Footnote 2 also recognizes that the Director has the authority to approve additional field test standards and/or

13 equipment beyond those recommended by NIST or specified in a Handbook 105 or other documentary standard. NIST

14 OWM periodically receives inquiries regarding the use of various types of test equipment and test methods. OWM

15 has worked with state weights and measures programs and industry to develop standards and procedures and

16 recommendations on the use of such equipment/methods and, in some cases this has resulted in a specific

17 recommendation or Handbook 105. However, as recognized, in Footnote 2, this does not preclude the Director from

18 approving equipment for which a specific Handbook 105 or other documentary standard does not exist.

19 In order to be considered suitable for use in official testing of a commercial weighing or measuring device, field test

20 standards and procedures need to meet a list of what is often referred to as the “Essential Elements of Traceability.”

21 This list includes elements outlined in NIST IR6969 GMP-13 Good Measurement Practice for Ensuring Metrological

22 Traceability shown above in the proposed Section 3.1.1. Essential Elements of Traceability. Provided steps are taken

23 to ensure that a given field test standard has been demonstrated to meet the requirements in these elements, it is

24 appropriate for that field test standard to be used in the official inspection and testing of a commercial weighing or

25 measuring device or for use by a service company in testing and placing a device back into service after service work.

26 While Footnote 2 already provides a statement regarding the authority of the Director to approve such equipment,

27 OWM believes including additional information regarding the essential elements of traceability and a reference to

28 specific measurement practices would be helpful to both emphasize that authority and provide guidance to Directors

29 and industry regarding the selection of appropriate field test standards.

30 NIST OWM recommends the guidance originally included in Footnote 2 along with the additional references to the

31 “Essential Elements” described above are best included in the body of Section 3 for clarity and ease of use.

32 Consequently, OWM recommends deleting the existing Footnote 2 and incorporating its contents into the body of

33 Section 3.

34 OWM also believes that some may erroneously believe that field test standards must be specifically listed within a

35 NIST Handbook 44 code in order to be used in the inspection and testing of devices covered by that code. Providing

36 a clear statement that this is not the case along with a reference to the required criteria may help alleviate this

37 misunderstanding.

38 The submitter acknowledges that Footnote 2 already provides a clear statement that the Director has authority to

39 approve standards which are not addressed by a NIST Handbook 105 Series handbook. Some might argue that the

40 proposed inclusion of additional information and guidance is not necessary.

41 The submitter states that these items are fully developed and requested that this be a Voting Item in 2022.

42 **Additional Justification for the Formula in the Proposed G-T.5.**

43 **Assessment of the 2/3 Formula and the OIML “Reduced MPE” Formula**

1 The 2/3 Formula: Increased MPE = $(2/3 \times \text{MPE} + U)$ with an upper limit of $U_{\text{MAX}} = 2/3 \text{ MPE}$

2 OIML Formula: Reduced MPE = $(4/3 \times \text{MPE} - U)$

3 *Note: The general term “standard” is used in this paper to address both field standards and transfer standards. The*
 4 *specific terms “field standard” and “Type 2 transfer standard” (T2TS) distinguish between these two types of*
 5 *standards according to the proposed definitions submitted to the NCWM by Seraphin. Type 1 transfer standards*
 6 *(T1TS) are not addressed in this paper.*

7 Based on the results of a discussion between one of the submitters (Seraphin) and Marc Buttler, Emerson - Micro
 8 Motion, the submitters agreed to recommend the 2/3 formula for use rather than the OIML formula. However, it is
 9 essential that an upper limit be established on the uncertainty associated with a Type 2 transfer standard (abbreviated
 10 as T2TS). The submitters agreed to recommend this upper limit not exceed 2/3 of the MPE of the commercial device
 11 under test. The same limit should be used if the OIML formula is used.

12 The OIML formula and the 2/3 formula are similar, but they take different approaches to establish the tolerances for
 13 the device under test. The 2/3 formula is more logical, more technically consistent with the Handbook 44 concept of
 14 Type 2 transfer standards, and it is easier to understand. The 2/3 formula combines the tolerance that remains to be
 15 used by the commercial device with the growing uncertainty of the T2TS into one total tolerance value, whereas the
 16 OIML Reduced MPE calculates only the tolerance applied to test of the commercial meter under test. When Type 2
 17 transfer standards are used in the field, the uncertainties associated with the T2TS should be recorded on the report
 18 form or a copy of the calibration certificate should be left with the test report, so the uncertainty values are available
 19 on site and can be used in an analysis should the tests with another T2TS generate different results.

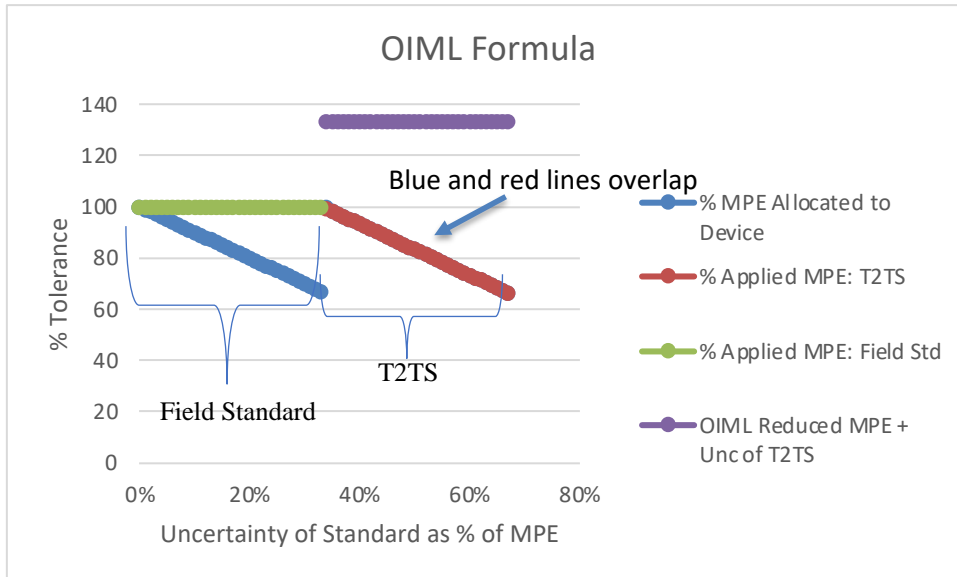
20 The most accurate reference standard that is available should always be used for any field test. However, when the
 21 only practical option for a field test that is available is a Type 2 transfer standard, the 2/3 formula will err in favor of
 22 the commercial device to avoid failing a device that should have passed. Conversely, the OIML Reduced MPE might
 23 result in failing a commercial device that would have passed had a more accurate (e.g., Type 1 transfer or field)
 24 reference standard been available to use for the test.

25 **Conclusion**

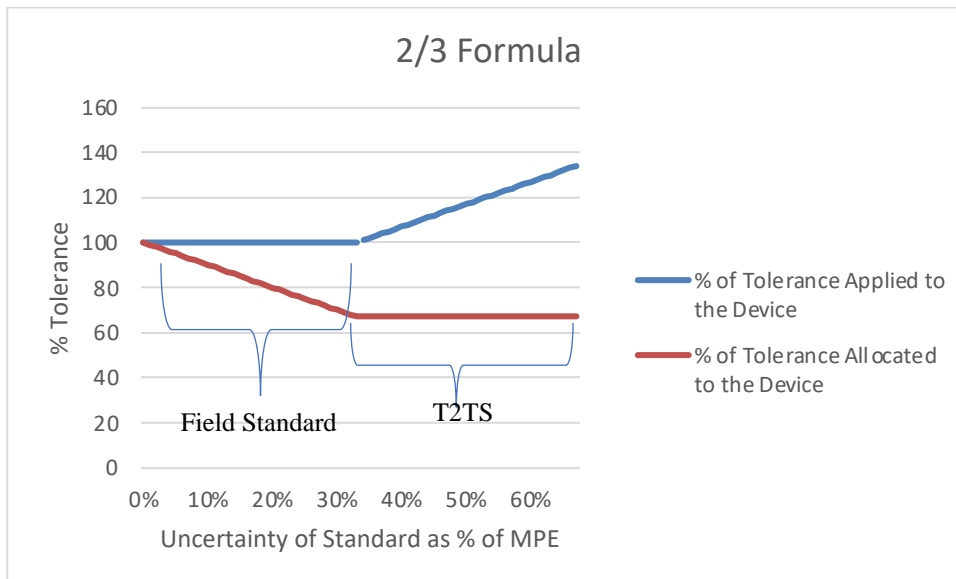
26 Field standards are intended to have an error and uncertainty less than or equal to 1/3 of the tolerance applied to the
 27 commercial device under test. When a Type 2 transfer standard has an uncertainty slightly greater than 1/3 of the
 28 tolerance, then, using the 2/3 formula, the total tolerance applied to the device under test increases above the H44
 29 tolerance by the amount that the uncertainty associated with the Type 2 transfer standard exceeds the 1/3 limit, thereby
 30 establishing a total tolerance slightly greater than the H44 tolerances specified in the applicable codes and keeping the
 31 portion of the tolerance that remains allocated to the device under test at a constant level equal to 2/3 of the H44
 32 tolerance. When the uncertainty for the Type 2 transfer standard exceeds 1/3 of the MPE, the OIML formula resets
 33 the “Reduced MPE” (applied tolerance) to 100% of the MPE. As the uncertainty of the Type 2 transfer standard gets
 34 larger and larger, the tolerance allocated to the device under test (e.g., a meter since OIML R117 applies to meters)
 35 gets smaller and smaller, to the extent that it is not realistic to use a T2TS to test a commercial meter, because the
 36 uncertainty of the T2TS uses up most of the device tolerance. The 2/3 formula is consistent with (but actually smaller
 37 than) the usual H44 tolerances that state that the basic tolerances are to be increased by two standard deviations when
 38 using a T2TS. Note that with a U_{MAX} of 2/3 MPE for the maximum uncertainty of the T2TS, the applied tolerance
 39 associated with the field test result using the 2/3 formula never exceeds 1.33 of the original H44 tolerance for the
 40 device under test. The submitters note that, while these principles and associated formula were established to apply
 41 to metering systems, the concepts can apply equally to other types of commercial weighing and measuring equipment.

42 The 2/3 formula specifies the total uncertainty as the device tolerance when a T2TS is used. The OIML formula
 43 generates only the tolerance applied to the meter under test when a T2TS is used. The OIML formula is designed to
 44 keep the **combined** Reduced MPE value plus the uncertainty associated with the T2TS equal to 1.33 MPE. The OIML
 45 formula should also have an upper limit for the uncertainty of the T2TS as well, which should be U_{MAX} of 2/3 MPE.
 46 Note that when there is an upper limit of 2/3 the MPE, then the OIML formula always has a tolerance (applied MPE
 47 or the Reduced MPE) that is greater than or equal to 2/3 of the original MPE. The OIML Reduced MPE is the tolerance

1 applied to the reading of the meter under test compared to the reading of the T2TS. Consequently, the use of the
 2 Reduced MPE with a T2TS is a meter-to-meter or device-to-device tolerance.



3



4

5 The error in the device under test is determined as the difference between the indication of the device under test
 6 compared with the value represented or measured by the standard (usually presumed to have zero error or corrections
 7 are used for any errors in the standard).

8 The increase in the applied tolerance when using a Type 2 transfer standard applies only to the basic tolerances for
 9 devices as defined in Handbook 44, i.e., acceptance, maintenance and minimum tolerances.² Note that the repeatability

² **basic tolerances.** – Tolerances on underregistration and on overregistration, or in excess and in deficiency, that are established by a particular code for a particular device under all normal tests, whether maintenance or acceptance.

1 tolerance and the special test tolerances are NOT increased. [Note that the definition should apply to all codes, not
 2 just those listed with the definition, which do not include all codes that refer to basic tolerances.]

3 ***Explanation and Assessment***

4 *Field Standards: Uncertainty is Part of the Tolerance*

5 Under the Fundamental Considerations, the correction and uncertainty of field standards are not to exceed 1/3 of the
 6 tolerance for the device under test. Under this condition, field standards are considered to be known values and the
 7 H44 tolerance is applied to the device under test without any consideration for the uncertainty associated with the field
 8 standard. The uncertainty associated with field standards may vary from nearly zero relative to the tolerance for the
 9 device under test up to 1/3 of the tolerance for the device under test. Even though the field standard may have an
 10 uncertainty as large as 1/3 of the tolerance applied to the device under test, the tolerance specified in H44 for the
 11 device is applied without consideration for the uncertainty associated with the field standard. The objective of this
 12 limit on the uncertainty associated with field standards "...is to give the device being tested as nearly as practicable
 13 the full benefit of its own tolerance."³ Once the uncertainty associated with a "standard" exceeds the 1/3 limit, the
 14 "standard" no longer qualifies as a field standard, but is a Type 2 transfer standard under Seraphin's proposed
 15 definitions.

16 *Type 2 Transfer Standards: Uncertainty is Added to the Tolerance*

17 When the uncertainty associated with a T2TS exceeds 1/3 of the tolerance applied to the device under test, the
 18 uncertainty of the T2TS is recognized in the field test result by increasing the tolerance that is applied to the device
 19 under test. The OIML formula and the 2/3 formula take different approaches to increasing the tolerance for the device
 20 under test.

Basic tolerances include minimum tolerance values when these are specified. Special tolerances, identified as such and pertaining to special tests, are not basic tolerances. [2.20, 2.22., 3.34, 3.38, 4.42, 5.54]

³ Handbook 44, Fundamental Considerations, Section 3.2

	Field Standard	Field Standard	OIML Formula	OIML Formula	2/3 Formula	2/3 Formula
Uncertainty of Standard (as % of Tolerance)	% of MPE (Tolerance) Applied to the Device	% MPE (Tolerance) Allocated to Device	% of MPE Applied to the Difference in the Test Results Using a T2TS	OIML Reduced MPE and Uncertainty of T2TS (%)	% of Combined Tolerance and Uncertainty Applied to the Device	% of Combined Tolerance and Uncertainty Allocated to the Device
0%	100	100				
10%	100	90				
20%	100	80				
30%	100	70				
33%	100	67				
34%			99	133	101	67
40%			93	133	107	67
50%			83	133	117	67
60%			73	133	127	67
67%			67	133	133	67
70%			63	133	137	67
80%			53	133	147	67
90%			43	133	157	67
100%			33	133	167	67

1
2 The OIML formula increases the tolerance applied to the device under test by 1/3 minus the uncertainty of the T2TS
3 as soon as the uncertainty of the Type 2 transfer standard exceeds the 1/3 limit. This increase recognizes the uncertainty
4 that is up to 1/3 of the tolerance for field standards. Hence, the tolerance applied to the device under test plus the
5 uncertainty of the T2TS is 1.33 times the original MPE when the uncertainty of the Type 2 transfer standard exceeds
6 1/3 of the MPE. As the uncertainty of the Type 2 transfer standard increases, the portion of the MPE allocated to the
7 meter under test for the field test result decreases. If the uncertainty of the Type 2 transfer standard becomes very
8 large, the poor accuracy and/or poor repeatability of Type 2 transfer standard makes its use ineffective.

9 In the 2/3 approach, the formula starts with 2/3 of the device tolerance (i.e., the MPE) apportioned to the device under
10 test, which is the situation when the uncertainty of a field standard is exactly equal to 1/3 of the device tolerance. Next,
11 the uncertainty associated with the T2TS is added to the 2/3 of the original MPE. Consequently, the tolerance (i.e.,
12 the MPE) applied to the field test gradually increases by the same amount as the uncertainty for the Type 2 transfer
13 standard increases above the 1/3 level of the original MPE. An upper limit for the uncertainty of the T2TS is proposed
14 to be 2/3 of the MPE, so that the uncertainty does not increase without limit and become meaningless. Hence, the
15 tolerance applied to the device under test, when a T2TS has an uncertainty at the upper limit of 2/3 the MPE, the total
16 tolerance plus the uncertainty will be 1.33 times the original MPE, which is equal to the maximum allowed by the
17 OIML formula for the Reduced MPE plus the uncertainty of the T2TS when the uncertainty of the T2TS just exceeds
18 the 1/3 limit.

19 *The Impact of Large Uncertainties for Field and Transfer Standards*

20 When different standards are used to test the same commercial devices, there is the possibility that the results will not
21 agree exactly. As the uncertainties associated with the field or Type 2 transfer standards increase, then the probability
22 increases that the field test results will not agree or even agree within tolerance. The concern is that some commercial
23 devices could be tested with one standard and pass (or fail) the field tests, but, when tested with a different standard,
24 some commercial devices would fail (or pass) the field tests. Consequently, it is important to keep the uncertainties

1 associated with the standards used to test commercial devices as small as reasonably possible, so that the probabilities
 2 of getting different field test results when using different standards are reduced.

3 **Regional Associations' Comments on GEN-19.1:**

4 WWMA 2021 Annual Meeting: Marc Buttler (Emerson Micro Motion): Regards to the fine work of the workgroup
 5 and authors of form 15, he finds it useful and helpful by augmenting the existing wording to add clarity as we work
 6 forward to more practical testing. He wanted to comment on whether the underlying principle of affording additional
 7 tolerance not capable of meeting the 1/3rd. In the language there is an equation (lower down in the proposal) reduced
 8 MPE. This is intended to penalize the tolerance of the device and not give additional leeway. Further into the
 9 justification it references an established principle that says that additional tolerance is afforded when complex. A
 10 better equation would be to take the MPE x 2/3 PLUS and not minus. This avoids jurisdictions having different
 11 uncertainty testing to different tolerances. He can prepare a written summary of his comments and will send to us.
 12 Bob Murnane (Seraphin): Seraphin proposed this. There is a lack of definitions. This comes into play in block 5. This
 13 was put in to clarify and give definite definitions to field and transfer standards. He hopes this clarifies multiple items
 14 on the agenda. Russell Vires (Scale Manufacturers Association): This item has been around for a while and was part
 15 of block 1. It has been pulled out and changed. The SMA has made comments in the past to support this item, but at
 16 this point they will meet in November and review; they have not been able to review the substantial changes yet. They
 17 have no position as of now. This needs to remain developing to allow stakeholders the opportunity to review.

18 Diane Lee (NIST OWM): Wants to expand on Russ's comments. This was included in a block with terminology for
 19 standards, (master meter, transfer standard or field standard). She questioned whether the transfer standards could
 20 meet the 1/3 standard. NIST has an analysis from the annual meeting that will address some of the issues; however,
 21 they have not met as a group yet. We can look online on NCWM and look forward to them providing additional info.
 22 (Previous analysis is available on the NCWM website).

23 The WWMA recommended that this be a Developing Item.

24 SWMA 2021 Annual Meeting: Mr. Henry Oppermann, representing Seraphin, explained the differences between
 25 Field Standards, Type 1 and Type 2 Transfer Standards, and expressed support for a proposed change that originated
 26 in the Western. Mr. Tim Chesser, State of Arkansas, questioned what "sufficient data" would be once a device is
 27 placed into service as a Standard, and how often it would need to be reverified. Mr. Oppermann responded to Mr.
 28 Chesser stating that the Master Meter Task Group must evaluate the performance of these devices and create
 29 calibration and performance requirements in the future. Russ Vires, Scale Manufacturers Association, stated that they
 30 have no position at this time. Russ Vires, Mettler Toledo, stated that he believes this is in conflict with Block 1, and
 31 would recommend it continue with a Developing status. Mr. Michael Keilty, Endress + Hauser, assured Mr. Chesser
 32 that any devices used as a Field Standard would have a traceable chain of metrology.
 33

34 The SWMA recommended that this item remain Assigned pending the Workgroup finding a new Chairperson.

35 CWMA 2021 Interim Meeting: Tina Butcher-NIST about working together with Seraphin to develop more. Robert
 36 Murnane-Seraphin Test Measure agreed with Tina and looked forward to working together. Should stay as
 37 developing. Lou Straub-SMA has not had the chance to review but would be meeting in two weeks.
 38

39 CWMA S&T Committee recommends item move forward as a developing item.

40 NEWMA 2021 Interim Meeting: Henry Opperman (W&M Consulting/Seraphin) Commented that they are updating
 41 the formula in the proposal due to the feedback received from the Western Weights and Measures Association and
 42 recommended a Developing Status. Updates can be found on the NCWM website. Lou Straub representing the SMA
 43 agreed with a Developing Status and reminded us that SMA positions have been posted on the NCWM website.

44 The NEWMA Specifications and Tolerances Committee recommends that this item be given a Developing Status.

CWMA Report: B8: OTH-22.1	
Regional recommendation to NCWM on item status:	
<input checked="" type="checkbox"/>	Recommend as a Voting Item on the NCWM agenda
<input type="checkbox"/>	Recommend as an Information Item on the NCWM agenda
<input type="checkbox"/>	Recommend as an Assigned Item on the NCWM agenda <i>(To be developed by an NCWM Task Group or Subcommittee)</i>
<input type="checkbox"/>	Recommend as a Developing Item on the NCWM agenda <i>(To be developed by source of the proposal)</i>
<input type="checkbox"/>	Recommend Withdrawal of the Item from the NCWM agenda <i>(In the case of new proposals, do not forward this item to NCWM)</i>
<input type="checkbox"/>	No recommendation from the region to NCWM <i>(If this is a new proposal, it will not be forwarded to the national committee by this region)</i>
Comments and justification for the regional recommendation to NCWM: (This will appear in NCWM reports)	
Russ Vires – SMA - Supports OTH-22.1 as developing. Stakeholders need to review and provide input to the submitter.	
The CWMA S&T Committee recommends this moves forward as a voting item.	

- 1
- 2 Additional letters, presentation and data may have been submitted for consideration with this item. Please refer to
- 3 <https://www.ncwm.com/publication-16> to review these documents.

Mr. Charles Stutesman, Kansas | Committee Chair
Mr. Daniel Walker, Ohio | Member
Mr. Brett Willhite, Minnesota | Member
Mr. Brandon Wahlfeldt | North Dakota |Member
Mr. Nick Owens, Stark County, Ohio | NCWM Representative

Specifications and Tolerances Committee

Appendix A

Item Block 2 – Final Report of the Verification Scale Division Task Group

Participants:

Doug Musick, Chair (KS)
Ross Andersen (NY, Retired and original submitter of the item)
John Barton (NIST OWM)
Luciano Burtini (Measurement Canada)
Anthony Bong Lee (Orange County, CA)
Steve Cook (CA, Retired)
Darrell Flocken (NTEP)
Eric Golden (Cardinal Scale)
Jan Konijnenburg (Rice Lake Weighing Systems)
Richard Suiter (Richard Suiter Consulting)
Steve Timar (NY)
Howard Tucker (FL)

The mission of the task group, as defined by the S&T Committee, is to review Handbook 44, Section 2.20. Scales and relevant portions of OIML R76, using the items included in S&T Agenda Items: Block 2 as a reference point, and recommend changes as necessary to:

1. Clarify how the error is determined in relation to the verification scale division (e) and the scale division (d)
2. Clarify which is the proper reference; the verification scale division (e) or the scale division (d) throughout this section
3. Ensure proper selection of a scale in reference to the verification scale division (e) and the scale division (d)
4. Clarify the relationship between the verification scale division (e) or the scale division (d)

This report is divided into three sections:

1. Clarify the relationship between e and d, i.e., ensure we understand the terms. (Mission items 4 and 1)
2. Propose changes to the Scales Code, if necessary, to ensure the code correctly identifies e or d as appropriate to the code paragraph. (Mission items 2 and 3)
3. Address other issues that arose as potential problems that might require additional investigation beyond the scope of this workgroup.

PART 1. Clarify the Relationship Between e and d.

We begin by looking at current HB44 definitions. The verification scale division e is used to express tolerance values and it is used in classification. The designations of e and the accuracy class are made by the manufacturer. The scale division d is a function of the actual scale function and display. Note that for weight classifiers, the weighing instrument may never display quantity at the resolution of e, and for ungraduated devices there is no scale division d to permit comparison to e.

verification scale division, value of (e). – A value, expressed in units of weight (mass) and specified by the manufacturer of a device, by which the tolerance values and the accuracy class applicable to the device are determined. The verification scale division is applied to all scales, in particular to ungraduated devices since they have no graduations. The verification scale division (e) may be different from the displayed scale division (d) for certain other devices used for weight classifying or weighing in pre-determined amounts, and certain other Class I and II scales.[2.20]

scale division, value of (d). – The value of the scale division, expressed in units of mass, is the smallest subdivision of the scale for analog indication or the difference between two consecutively indicated or printed values for digital indication or printing. (Also see “verification scale division.”) [2.20, 2.22]

scale division, number of (n). – Quotient of the capacity divided by the value of the verification scale division. [2.20]

$$n = \frac{\text{Capacity}}{e}$$

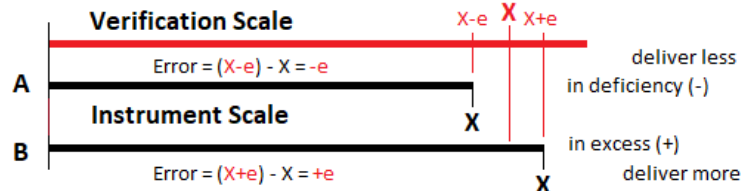
The values of e and d must be understood as referring to different things. The verification scale refers to the scale of measurement for the reference (or true value), think of the reference standard. The instrument scale refers to the scale of measurement of the instrument under test. Consider this assortment of instruments in the table below. It should be clear that the divisions of the verification scale do not always equal those on the instrument scale and may not even be in the same units. In addition, when we employ an artifact, like a test weight or slicker plate measure, the divisions of the verification scale are not visible since the artifact represents a single point on the measurement scale of the reference.

Instrument Scale	Scale div d	Verification “True Value” Scale	Scale div e	Relation e to d
Rule	1/16 in	Standard Rule or Tape	1/16 in	e = d
Taximeter	1/10 mi	Road Course	2 ft	e << d
LMD’s	0.1 gal	Prover indication	5 cu in	e > d
Mass Flow Meter	1 lb	Reference Scale	0.01 lb	e < d
Weighing Devices	0.01 lb	Test Weight (artifact)	mfr choice	e < d, e = d, e > d
Test Measure	1 cu in	Slicker Plate (artifact)	?	e ? d

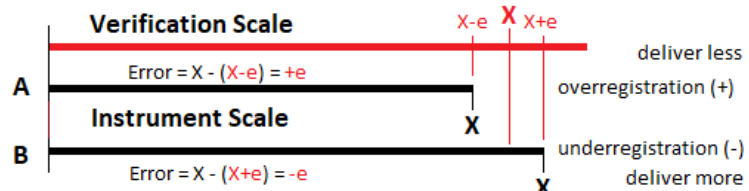
For weighing instruments, it turns out that e and d have no fixed relationship. It is different for weight classifiers (e < d), for most instruments (e = d), and for high resolution instruments (e>d). The critical point is that the instrument scale and the verification scale are independent of each other. Once you have disconnected e (declared by the manufacturer) from d (displayed on the instrument), it may now become evident that much of our confusion arose because we thought of them as connected in some way.

In the graphics below both error and tolerance are always expressed in terms of the divisions (e) of the verification scale. The primary assumption is that the verification scale is constant, and it is the displayed scales of the instruments we test that move. The scales in black are depicted as in error by +1 e or –1 e.

Error of delivery =
 verification scale – instrument scale
 + in excess
 – in deficiency



Error of Indication =
 instrument scale – verification scale
 + overregistration
 – underregistration



Much of our confusion arises because scales are tested using artifacts with no visible scale divisions. We could mirror this in the test of a fuel dispenser. Normally you stop the test at 5 gallons on the instrument scale and read the error as – 3 cu in from the test measure (verification) scale. Now change that procedure and stop the test at the zero mark on the test measure. How would you determine the error? Assume the instrument now reads 5.012 gal. The error is -0.012 gal (-3 cu in), and we calculate it as verification scale – instrument scale. We determined the error from the instrument scale. The verification scale division, however, did not switch from the test measure to the instrument simply because we changed the procedure. The verification scale division remains 1 cu in and is still on the test measure, the reference.

Consider the Class III scale at right where $e = d$. Technically you can't see divisions on either scale since the artifact has no visible divisions and the instrument is digital. The correct instrument indication of 500 d is 1.2 e short of 500 e on the verification scale. You could mirror this by applying 498.8 e of test weights to get indication of 500 d. It is not in tolerance, but only if you apply error weights in your test.

Consider the Class II scale at right where $e = 10 d$. You can't see divisions on either scale because the test weight is an artifact and the instrument are digital. The correct instrument indication of 50,000 d is short of the 5,000 e on the verification scale by 7 d. Thus, we say the error is $+0.7 e$. Error = instrument scale – verification scale. This instrument is clearly in tolerance. No error weights are necessary to see to finer than 1 e.

The principles of classification are found in the following HB44 paragraphs. In principle, the manufacturer tells the official what accuracy is to be applied to the instrument.

T.N.1. Principles.

T.N.1.1. Design. – The tolerance for a weighing device is a performance requirement independent of the design principle used.

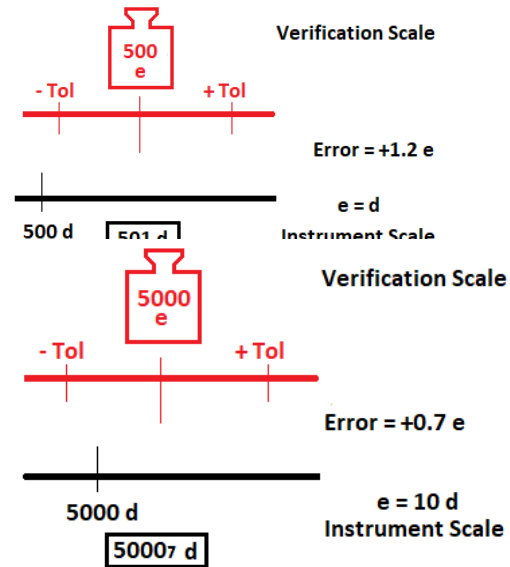
T.N.1.2. Accuracy Classes. – Weighing devices are divided into accuracy classes according to the number of scale divisions (n) and the value of the scale division (d).

T.N.1.3. Scale Division. – The tolerance for a weighing device is related to the value of the scale division (d) or the value of the verification scale division (e) and is generally expressed in terms of d or e.

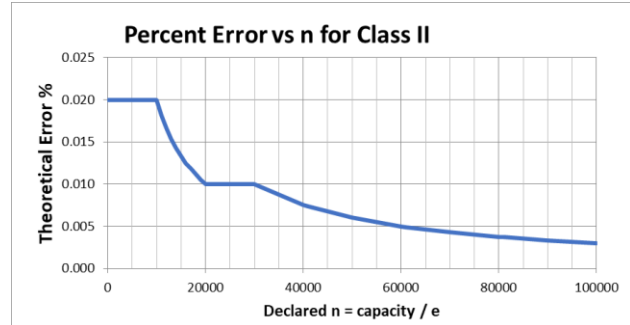
Yet, the T.N.1.2. and T.N.1.3. paragraphs conflict with the definitions. According to the definition of e, it is e “by which the tolerance values and the accuracy class applicable to the device are determined.” When the Scales Code was drafted prior to adoption in 1984, it appears some things were lost in translation from the OIML R76 on which it was based. What was lost can be expressed as those things not included in HB44 and those things incorrectly translated in HB44.

For example, R76 expresses the classification information in four required markings, and one auxiliary marking. R76 requires marking of Class, Max, e, and Min, and requires marking of d if different from e. Those markings describe the maximum and minimum loads and the relative accuracy. In contrast, HB44 requires marking of Class, capacity, and d, and requires marking of e if different from d. HB44 does not require marking of minimum load. While R76 considers minimum load part of the class structure, HB44 does not.

It is this switch of e and d that causes confusion because the translation of R76 to HB44 lost some of the meaning. Much of the second part of this report covers the changes required to rectify the situation. The workgroup is attempting to ensure the Code states e when the requirement applies to e and d when it applies to d. The workgroup is also proposing to add important material from R76 that is missing.



Some additional confusion comes from the stepped tolerance structure. For example, it is common to think that the instrument gets 1 division of error over the first tolerance step (maintenance). The correct interpretation of the code requires the instrument maintain a % accuracy based on the number of divisions of load at the break points. The space under the step riser is not supposed to be used by the instrument provided you eliminate the rounding error.



Between 1 division and 10,000 divisions for Class II in R76, this is 0.02%. At 10,000 e, 0.02% is 2 e. At 1,000 e, 0.02% is 0.2 e, and at minimum load of 50 e, 0.02% is 0.01 e. The principle is: the larger the number of verification scale divisions (n) the more accurate the instrument must be, i.e. relative error. Section 2.2 of R76 makes this clear by stating that e represents absolute accuracy and n represents relative accuracy. The Scales Code has no parallel section. It is the relative accuracy that should be our focus, but that's not found in HB44.

PART 2. Proposed changes to the Scales Code (related issues are grouped for convenience)

Group 1. Changes to clarify definitions relating to e.

verification scale division, value of (e). – A value, expressed in units of weight (mass) and specified by the manufacturer of a device, by which the tolerance values and the accuracy class applicable to the device are determined. The verification scale division is applied to all scales, in particular to ungraduated devices since they have no graduations. ~~The verification scale division (e) may be different from the displayed scale division (d) for certain other devices used for weight classifying or weighing in pre-determined amounts, and certain other Class I and II scales.~~[2.20]

(Amended 20XX)

The last sentence is explained fully in the technical requirements in the Code. The workgroup finds it unnecessary and believe it contributes to confusion.

verification scale division, number of (n). – Quotient of the capacity divided by the value of the verification scale division. [2.20]

$$n = \frac{\text{Capacity}}{e}$$

(Amended 20XX)

scale division, number of (n). – See “verification scale division, number of (n)”

The addition of the word “verification” to the definition of n is essential since without it the section refers to the scale division d. The second definition for n was added as a cross reference since the revision will move from the s section to the v section.

Group 2. Changes to ensure proper classification of instruments.

T.N.1.2. Accuracy Classes. – Weighing devices are divided into accuracy classes according to the number of verification scale divisions (n) and the value of the verification scale division ~~(d)~~ (e).

(Amended 20XX)

T.N.1.3. Verification Scale Division. – The tolerance for a weighing device is ~~related to the value of the scale division (d) or the value of the~~ in the order of magnitude of the verification scale division (e) and is generally expressed in terms of ~~d or e~~.

(Amended 20XX)

These changes bring the principles in the T.N. section in agreement with the definitions. Classification is exclusively based on e.

Table 3. <i>Parameters for Accuracy Classes</i>			
<i>Class</i>	<i>Value of the Verification Scale Division (d or e¹)</i>	<i>Number of <u>Verification Scale</u>⁴ Divisions (n)</i>	
		<i>Minimum</i>	<i>Maximum</i>
<i>SI Units</i>			
<i>I</i>	<i>equal to or greater than 1 mg</i>	<i>50 000</i>	<i>--</i>
<i>II</i>	<i>1 to 50 mg, inclusive</i>	<i>100</i>	<i>100 000</i>
	<i>equal to or greater than 100 mg</i>	<i>5 000</i>	<i>100 000</i>
<i>III^{2,5}</i>	<i>0.1 to 2 g, inclusive</i>	<i>100</i>	<i>10 000</i>
	<i>equal to or greater than 5 g</i>	<i>500</i>	<i>10 000</i>
<i>III L³</i>	<i>equal to or greater than 2 kg</i>	<i>2 000</i>	<i>10 000</i>
<i>IIII</i>	<i>equal to or greater than 5 g</i>	<i>100</i>	<i>1 200</i>

¹ *For Class I and II devices equipped with auxiliary reading means (i.e., a rider, a vernier, or a least significant decimal differentiated by size, shape, or color), the value of the verification scale division “e” is the value of the scale division immediately preceding the auxiliary means. The verification scale division e does not always equal the displayed scale division d. To ensure the correct value for e is used, refer to required markings on the device (see also notes 3 and 4 in Table S.6.3.b.).*

² *A Class III scale marked “For prescription weighing only” may have a verification scale division (e) not less than 0.01 g.*

(Added 1986) (Amended 2003)

³ *The value of a verification scale division for crane and hopper (other than grain hopper) scales shall be not less than 0.2 kg (0.5 lb). The minimum number of verification scale divisions, n, shall be not less than 1000.*

⁴ *On a multiple range or multi-interval scale, the number of verification divisions, n, for each range independently shall not exceed the maximum specified for the accuracy class. The number of verification scale divisions, n, for each weighing range is determined by dividing the scale capacity for each range by the verification scale division, e, for each range. On a scale system with multiple load-receiving elements and multiple indications, each element considered shall not independently exceed the maximum specified for the accuracy class. If the system has a summing indicator, the n_{max} for the summed indication shall not exceed the maximum specified for the accuracy class.*

(Added 1997)

⁵ *The minimum number of verification scale divisions, n, for a Class III Hopper Scale used for weighing grain shall be 2000.)*

[Nonretroactive as of January 1, 1986]

(Amended 1986, 1987, 1997, 1998, 1999, 2003, ~~and~~ 2004 ~~and~~ 20XX)

The middle section of the table was not included for brevity. Notes continue below:

The changes to the header of Table 3 ensure the classification is based on e consistent with the definitions and the principles in T.N.1. The scale division d is not involved in classification. This change should reduce confusion. The

changes to the notes at the bottom of the table again ensure e is correctly referenced instead of d or the “scale division.” Referencing “n” in notes 3, 4, and 5 ensure that it is referring to e since $n = \text{capacity} / e$.

Table S.6.3.a. Marking Requirements					
To Be Marked With ↓	Weighing Equipment				
	Weighing, Load- Receiving, and Indicating Element in Same Housing or Covered on the Same CC¹	Indicating Element not Permanently Attached to Weighing and Load- Receiving Element or Covered by a Separate CC	Weighing and Load- Receiving Element Not Permanently Attached to Indicating Element or Covered by a Separate CC	Load Cell with CC (11)	Other Equipment or Device (10)
Manufacturer’s ID (1)	X	X	X	X	X
Model Designation and Prefix (1)	X	X	X	X	X
Serial Number and Prefix (2)	X	X	X	X	X (16)
Certificate of Conformance Number (CC) (23)	X	X	X	X	X (23)
Accuracy Class (17)	X	X (8)	X (19)	X	
Nominal Capacity (3)(18)(20)	X	X	X		
Value of Scale Division, “d” (3 4)	X	X			
Value of <u>Verification Scale Division</u> , “e” (4 3)	X	X			
Temperature Limits (5)	X	X	X	X	

Note: The remainder of the table was not included for brevity.

The changes to column 1 in the 7th and 8th rows simply reverse the references to the notes in Table S.6.3.b. They reflect the primacy of e in classification, which is addressed in parallel changes to notes 3 and 4 in Table S.6.3.b. (see changes to Table S.6.3.b. below).

Table S.6.3.b.
Notes for Table S.6.3.a. Marking Requirements

1. Manufacturer's identification and model designation and *model designation prefix*.*
[*Nonretroactive as of January 1, 2003]
(Also see G-S.1. Identification.) [*Prefix lettering may be initial capitals, all capitals or all lower case*]
(Amended 2000)
2. *Serial number* [Nonretroactive as of January 1, 1968] and *prefix* [Nonretroactive as of January 1, 1986]. (Also see G-S.1. Identification.)
3. The device shall be marked with the nominal capacity. *The nominal capacity shall be shown together with the value of the verification scale division, "e" (e.g., 15 × 0.005 kg, 30 × 0.01 lb, or capacity = 15 kg, ~~d~~ e = 0.005 kg) in a clear and conspicuous manner and be readily apparent when viewing the reading face of the scale indicator unless already apparent by the design of the device. Each verification scale division value ~~or weight unit~~ with its associated nominal capacity shall be marked on multiple range or multi-interval scales. In the absence of a separate marking of the scale division "d" (see Note 4), the value of the scale division "d" shall be equal to the value of the verification scale division "e."*
[Nonretroactive as of January 1, 1983]
(Amended 2005 and 20XX)
4. *Required only if different from "d": "e." This does not apply to an ungraduated device (equal arm scale) where the graduations do not refer to a fixed weight value.*
[Nonretroactive as of January 1, 1986]
(Amended 20XX)

The original Scales Code adopted 1984 made d the primary mandatory marking but this resulted in confusion. The changes make e the mandatory marking and now requires d only if different from e.

The changes regarding multiple range and multi-interval scales makes the note say what we have always been applying. The intent was for each range or subrange of the instrument to have marking of capacity and e. The "or weight unit" could refer to lb or kg, but that is clearly not the intent.

There is some concern if this might pose problems for existing equipment. If the marking is of the form "capacity 30 lb x 0.01 lb" the workgroup sees not conflict. However, markings in the form "capacity = 30 lb d = 0.01 lb" would cause a conflict as devices using that form would no longer conform with the proposed changes. The workgroup decided to refer this to the scale manufacturers to see if there are any devices in the marketplace that would be affected. We also learned that this might cause a conflict with Measurement Canada as they do see devices with markings of capacity= d=. Note this is not an issue when $e \neq d$ as both markings is already required by the combination of notes 3 and 4. If necessary, a note with qualification "devices manufactured before January 1, 20XX" could be added to accept existing scales marked with d = provided $d = e$.

S.1.2.2. Verification Scale ~~Interval~~ Division

The magnitude of the verification scale division *e* relative to the scale division *d* for different types of devices is given in Table S.1.2.2. Relative Magnitude of *e* to *d*.

Table S.1.2.2. Relative Magnitude of <i>e</i> to <i>d</i>	
Type of device (see Note)	Relative magnitude of <i>e</i> to <i>d</i>
<u>Graduated, without an auxiliary indicating device</u>	$e = d$
<u>Graduated, with an auxiliary indicating device</u>	$e > d$ and <i>e</i> is chosen by the <u>manufacturer according to Table 3. and S.1.2.2.1.</u>
<u>Graduated, and marked for use in special applications (weight classifier)</u>	$e < d$ and <i>e</i> is chosen by the <u>manufacturer according to Table 3. and S.1.2.2.4.</u>

Note: Ungraduated devices, e.g. equal arm balances where the scale graduations do not represent a fixed weight quantity, are not included in this table since they have no scale divisions (*d*) to permit comparison with (*e*).

S.1.2.2.1. Class I and II Scales and Dynamic Monorail Scales. – If $e \neq d$, the verification scale ~~interval~~ division “*e*” shall be determined by the expression:

$$d < e \leq 10 d$$

If the displayed scale division (*d*) is less than the verification scale division (*e*), then the verification scale division shall be less than or equal to 10 times the displayed scale division.

The value of *e* must satisfy the relationship, $e = 10^k$ of the unit of measure, where *k* is a positive or negative whole number or zero. This requirement does not apply to a Class I device with $d < 1$ mg where $e = 1$ mg. If $e \neq d$, the value of “*d*” shall be a decimal submultiple of “*e*,” and the ratio shall not be more than 10:1. If $e \neq d$, and both “*e*” and “*d*” are continuously displayed during normal operation, then “*d*” shall be differentiated from “*e*” by size, shape, color, etc. throughout the range of weights displayed as “*d*.”

(Added 1999) (Amended 20XX)

S.1.2.2.2. Class I and II Scales Used in Direct Sales. – When accuracy Class I and II scales are used in direct sale applications the value of the displayed division “*d*” shall be equal to the value of the verification scale interval “*e*.”

[Nonretroactive as of January 1, 2020; to become retroactive as of January 1, 2023]

(Added 2017)

S.1.2.2.3. Deactivation of a “*d*” Resolution. – It shall not be possible to deactivate the “*d*” resolution on a Class I or II scale equipped with a value of “*d*” that differs from “*e*” if such action affects the scale’s ability to round digital values to the nearest minimum unit that can be indicated or recorded as required by paragraph G-S.5.2.2. Digital Indication and Representation.

(Added 2018)

S.1.2.2.4. Class III and IIII Scales. The value of “*e*” is specified by the manufacturer as marked on the device. Except for dynamic monorail scales, “*e*” must be less than or equal to “*d*.”

(Added 1999)

S.5.3. S.1.2.2.5. Multi-Interval and Multiple Range Scales, ~~Division Value.~~ – On a multi-interval scale ~~and~~ or a multiple range scale, the value of “e” shall be equal to the value of “d.”
(Added 1986) (Amended 1995 and 20XX)

S.1.2.2.6. Class III L Scales. On Class III L scales the value of “e” shall equal the value of “d.”
(Added 20XX)

(Add new definition)

auxiliary indicating device. – a means to increase the display resolution of a weighing device, such as a rider or vernier on an analog device, or a differentiated least significant digit to the right of the decimal point on a digital device. [2.20]

(Added 20XX)

Section S.1.2.2. is a key part of understanding application of e and d. The first change was to make references uniform to verification scale “division” as used in all other parts of the code. This section currently uses the term verification scale “interval”. Several additions of the term “scale” were also added to S.1.2.2.1. for clarity. Of note, R76 exempts Class I from the e not greater than 10 d requirement when e = 1 mg or less.

A major addition is the new text and table in T.1.2.2. This would create a parallel section in HB44 to R76 section 3.1.2 and Table 2. This section describes four types of instruments:

1. Graduated without an auxiliary indicating device – most instruments e = d
2. Graduated with an auxiliary indicating device – Class I and II with high resolution e > d
3. Graduated & marked for special applications – weight classifiers (round down instruments) e < d
4. Ungraduated – equal arm balances where graduations don’t refer to fixed weight quantities. No d

These four types also impact application of minimum load in Table 8.

The current S.5.3. was moved to this section as S.1.2.2.5. to keep these paragraphs dealing with the magnitude of e and d together. A new paragraph S.1.2.2.6. was added to address Class III L where e should always equal d. Now all classes (I, II, III, III L, and III I) are covered in S.1.2.2. to clarify relative magnitude of e and d.

The addition of the definition rounds out the expansion of this section

~~S.5.4. S.5.3.~~ Relationship of Minimum Load Cell Verification Interval Value to the Verification Scale Division. – The relationship of the value for the minimum load cell verification scale interval, v_{min} , to the verification scale division, d ~~e~~ , for a specific scale using National Type Evaluation Program (NTEP) certified load cells shall comply with the following formulae where N is the number of load cells in a single independent¹ weighing/load-receiving element (such as hopper, railroad track, or vehicle scale weighing/load-receiving elements):

(a) $v_{min} \leq \frac{d^* e}{\sqrt{N}}$ for scales without lever systems; and

(b) $v_{min} \leq \frac{d^* e}{\sqrt{N} x \text{ (scale multiple)}}$ for scales with lever systems.

[*When the value of the scale division, d , is different from the verification scale division, e , for the scale, the value of e must be used in the formulae above.]

This requirement does not apply to complete weighing/load-receiving elements or scales, which satisfy all the following criteria:

- the complete weighing/load-receiving element or scale has been evaluated for compliance with

T.N.8.1. Temperature under the NTEP;

- *the complete weighing/load-receiving element or scale has received an NTEP Certificate of Conformance; and*
- *the complete weighing/load-receiving element or scale is equipped with an automatic zero-tracking mechanism which cannot be made inoperative in the normal weighing mode. (A test mode which permits the disabling of the automatic zero-tracking mechanism is permissible, provided the scale cannot function normally while in this mode.*

[Nonretroactive as of January 1, 1994]

(Added 1993) (Amended 1996, ~~and~~ 2016, ~~and~~ 20XX)

The renumbering resulted from the move of S.5.3. to the S.1.2.2. section as S.1.2.2.5. The other changes correctly reference e instead of d in this section. Technically, v_{min} for load cells corresponds to verification scale division e for weighing instruments. They are accuracy ratings declared by the manufacturer. There is no significant change for the inspector in properly referring to e since for scales where $e = d$ the issue is moot and when $e \neq d$ the section already directed the use of e. With the change the inspector will always use e.

Group 3. Changes to clarify appropriate application of tolerances (Marked Scales)

Table 6.				
Maintenance Tolerances				
(All values in this table are in <u>verification</u> scale divisions “e”)				
Tolerance in Scale Divisions				
	1	2	3	5
Class	Test Load			
I	0 - 50 000	50 001 - 200 000	200 001 +	
II	0 - 5 000	5 001 - 20 000	20 001 +	
III	0 - 500	501 - 2 000	2 001 - 4 000	4 001 +
IIII	0 - 50	51 - 200	201 - 400	401 +
IIIL	0 - 500	501 - 1 000	(Add 1 ϵ for each additional 500 ϵ or fraction thereof)	

The proper reference in this section has always been e, and this is how it has always been interpreted. The current language says “scale divisions” which technically refers to d. This means we weren’t following the Code. The removal of “in Scale Divisions” after Tolerances in the second row was made to provide parallel construction with the header for Test Load. The parenthetical at the top should be sufficient to cover both sections of the table.

The change for Class IIIL was made since e should be used to specify tolerances and we added S.1.2.2.6. requiring that $d = e$ for this class.

T.N.3.4. Crane and Hopper (Other than Grain Hopper) Scales. – The maintenance and acceptance tolerances shall be as specified in T.N.3.1. Maintenance Tolerance Values and T.N.3.2. Acceptance Tolerance Values for Class IIIL, except that the tolerance for crane and construction materials hopper scales shall not be less than 1 ϵ or 0.1 % of the scale capacity, whichever is less.

(Amended 1986 ~~and~~ 20XX)

T.N.4.3. Single Indicating Element/Multiple Indications. – In the case of an analog indicating element equipped with two or more indicating means within the same element, the difference in the weight indications for any load other than zero shall not be greater than one-half the value of the verification scale division (e) (~~d~~) and be within tolerance limits.

(Amended 1986)

The reference to tolerances in T.N.3.4. and T.N.4.3. should follow the principle of expressing tolerances in e.

Group 4. Changes to clarify appropriate application of tolerances (Unmarked Scales)

T.1. General. – The tolerances applicable to devices not marked with an accuracy class shall have the tolerances applied as specified in Table T.1.1. Tolerances for Unmarked Scales.

Note: When Table T.1.1. refers to T.N. sections it shall be accepted that the scale division d on the unmarked scale always equals the verification scale division e.

(Amended 20XX)

Prior to 1984, tolerances were based on percentage of load for most scales. There was no concept of verification scale division e. In the T.N. section all tolerances are expressed in e. The note is added to clarify that d for the T. section is always equal to e from the T.N. section.

The workgroup noted that several specific paragraphs in the T. section for unmarked scales refer to tolerances in terms of d. Those sections are shown below. With the addition of the note to T.1. General, it was decided that it was not appropriate or necessary to change the d to e in these paragraphs.

T.2.2. General. – Except for scales specified in paragraphs T.2.3. Prescription Scales through T.2.8. Railway Track Scales: 2 d, 0.2 % of the scale capacity, or 40 lb, whichever is least.

T.2.4.2. With More Than One-Half Ounce Capacity. – 1 d or 0.05 % of the scale capacity, whichever is less.

T.2.7. Vehicle, Axle-Load, Livestock, and Animal Scales.

T.2.7.1. Equipped With Balance Indicators. – 1 d.

T.2.7.2. Not Equipped With Balance Indicators. – 2 d or 0.2 % of the scale capacity, whichever is less.

T.2.8. Railway Track Scales. – 3 d or 100 lb, whichever is less.

Group 5. Changes to clarify appropriate scale selection (reference Table 8)

Table 8. Recommended Minimum Load		
Class	Value of <u>Verification</u> Scale Division "<u>e</u>" (d or e*)	Recommended Minimum Load <u>in</u> scale divisions "<u>d</u>" (See notes) (d or <u>e*</u>)
I	equal to or greater than 0.001 g	100
II	0.001 g to 0.05 g, inclusive equal to or greater than 0.1 g	20 50
III	All**	20
III L	All	50
IIIH	All	10

*For Class I and II devices equipped with auxiliary reading means (i.e., a rider, a vernier, or a least significant decimal differentiated by size, shape or color), the value of the verification scale division "e" is the value of the scale division immediately preceding the auxiliary means. For Class III and IIIH devices

the value of “e” is specified by the manufacturer as marked on the device; “e” must be less than or equal to “d.”

The displayed scale division d is not always equal to the verification scale division e. To ensure the correct values are used, refer to required markings on the device (see also notes 3 and 4 in Table S.6.3.b.).

For an ungraduated device, the scale division d shall be replaced with the verification scale division e in the last column.

******A minimum load of ~~10 d~~ 5 e is recommended for a weight classifier marked in accordance with a statement identifying its use for special applications.

In the header, the change in column 2 references e and the change in column 3 references d and directs you to the notes. Currently, the Code references (d or e) in both columns which causes confusion. We’re never sure which one to use. The justification for d in the last column follows below.

It is vital to understand that Table 8. is tied closely to Table 3. You will find that header to the first two columns in both tables, with these changes, will be identical. The workgroup also revised the * note to remove the * and use parallel text to revised note 1 of Table 3. The notes section contains two special exceptions to the general values in column 3 the table. The first directs you to use e in the last column for ungraduated instruments, as these have no d values. The second directs you to use a minimum load of 5 e for weight classifiers. This aligns the value with R76. Note that the use of d for weight classifiers leads to unusual situations. Two weight classifiers with 100 lb capacity and e of 0.05 lb should have the same minimum load. However, they might have very different d values, say 1 lb and 0.2 lb. Declaring minimum load as 10 d for these result in very large differences of 10 lb minimum load for the first instrument and 2 lb for the second. Since $e < d$ for weight classifiers, the minimum load is correctly expressed in e.

Understanding Minimum Load

In R76, minimum load “Min” is included in the principles of classification, see 2.2. below. There are 4 mandatory markings; Class, Max, Min and e. When R76 was translated into HB44 a conscious decision was made to remove Min from the classification and make it a user requirement. Thus, HB44 only has 3 mandatory markings; Class, Capacity, and d. We have already proposed to change the d to e above.

2.2 Principles of the metrological requirements

The requirements apply to all instruments irrespective of their principles of measurement.

Instruments are classified according to:

- the verification scale interval, representing absolute accuracy; and
- the number of verification scale intervals, representing relative accuracy.

The maximum permissible errors are in the order of magnitude of the verification scale interval. They apply to gross loads and when a tare device is in operation they apply to the net loads. The maximum permissible errors do not apply to calculated net values when a preset tare device is in operation.

A minimum capacity (Min) is specified to indicate that use of the instrument below this value is likely to give rise to considerable relative errors.

In R76, the issue of instrument accuracy is focused on Class, Max and e, parallel to HB44. Absolute accuracy in terms of e and relative accuracy in terms of n. When the load is very small, i.e. less than Min, it might appear that R76 is addressing the large relative errors resulting in 1 e tolerance for some small number of e in load. However, this is not the case. The distinction is that Min applies to use of the instrument and not to testing of the instrument.

In testing under R76 tolerances, rounding errors are eliminated (see 3.5.3.2.). In practice this usually means error weights are used to resolve the instrument errors to at least 0.2 e (NTEP generally uses 0.1 e). In addition, R76 expects that instrument divisions are relatively uniform throughout the series. In order to get a +1 e error at 1 e load and still meet the requirement that the zero division be +/- 0.5 division wide, would require the 1 e divisions be 0 e wide (i.e. be skipped). To visualize in analog, imagine an indicator that starts at zero and jumps immediately to the 2 graduation.

A load of 1 e would indicate 2 e. Likewise a load of 2 e would indicate 3 e and this pattern would repeat until the tolerance breakpoint, a load of 500 e would indicate 501 e. Then the second graduation after the break point would be skipped, i.e. the 502 e graduation. A load of 501 e would indicate 503 e with a +2 e error. All the loads up to 20,000 e would now show a +2 e error. Instruments obviously should not, and DO NOT, operate that way.

If we assume instrument divisions are uniform, as R76 does, then the divisions should be accurate to about the relative % of the accuracy class. For Class II in the first step this is 0.02%. Thus at 20 e load the maximum expected error (after eliminating rounding) should be in the order of 0.004 e, and not the 1 e permitted in the tolerance structure. So, what relative error can R76 be addressing when dealing with Min?

When an instrument is used in commerce, it is the rounding of the indication to ½ scale division that results in large relative errors. Consider a cannabis sale of 1.05 g when the division size is 0.1 g. The instrument must round off to either 1.0 g or 1.1 g. Either one produces an error in the weight of 0.05 g. That's 4.8% relative error in the weight (0.05 g / 1.05 g) with an instrument that's supposed to be accurate to 0.02%. It is this rounding error "in use" that produces the large relative errors addressed in Min in R76 and the minimum load in HB44. This rounding error is a function of d, the displayed scale division, and not e. It is not a tolerance issue.

The confusion comes from the presentation of Min in terms of e in the last column of R76 Table 3. The table in R76 has an additional column for Min not found in HB44. In HB44 it has been relocated to Table 8. Looking closely at Table 8, you will find that the first two columns correspond to the first two columns in Table 3 in HB44. So why does R76 express this column in e instead of d? I suspect they did it because all other values in Table 3 are in e. For instruments where e = d, the issue is moot. Note however, that R76 reveals the ties to d for the Class I and II instruments with an auxiliary indicating device (differentiated least significant digit). In 3.4.3. R76 directs that d replace e in the Min column of Table 3 for instruments with an auxiliary indicating device.

On an instrument where e = 10 d, we can create the same scenario as before but now with a load of 1.005 g. The instrument must now round to either 1.00 g or 1.01 g. The rounding error is now 0.50% of the weight (0.005 / 1.005). That is 10 times smaller at the same 20 e load.

Returning to the four types of instruments from revised S.1.2.2. and applying revised Table 8.:

- | | |
|--|-------------------|
| 1. Graduated without an auxiliary indicating device: | minimum load in d |
| 2. Graduated with an auxiliary indicating device: | minimum load in d |
| 3. Graduated and marked for special use (weight classifier): | minimum load 5 e |
| 4. Ungraduated (equal arm scales): | minimum load in e |

Group 6. Changes to correctly reference to e or d as appropriate.

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 verification scale division.

*(b) A digital indicating device shall either automatically maintain a "center-of-zero" condition to $\pm \frac{1}{4}$ verification 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 verification scale division or less. A "center-of-zero" indication may operate when zero is indicated for gross and/or net mode(s).
[Nonretroactive as of January 1, 1993]*

*(c) For electronic cash registers (ECRs) and point-of-sale systems (POS systems) the display of measurement units shall be a minimum of 9.5 mm (3/8 inch) in height.
[Nonretroactive as of January 1, 2021]*

(Added 2019)

(Amended 1992, 2008, ~~and~~ 2019, and 20XX)

The changes correctly reference e in this section as this is an issue of ensuring the zero indication is accurate to $\frac{1}{4} e$. Hence it is a tolerance properly expressed in terms of e.

T.N.9. Radio Frequency Interference (RFI) and Other Electromagnetic Interference Susceptibility. – The difference between the weight indication due to the disturbance and the weight indication without the disturbance shall not exceed one verification scale division ~~(d)~~ (e); or the equipment shall:

- (a) blank the indication; or
- (b) provide an error message; or
- (c) the indication shall be so completely unstable that it cannot be interpreted, or transmitted into memory or to a recording element, as a correct measurement value.

The tolerance in T.N.9. Radio Frequency Interference (RFI) and Other Electromagnetic Interference Susceptibility is to be applied independently of other tolerances. For example, if indications are at allowable basic tolerance error limits when the disturbance occurs, then it is acceptable for the indication to exceed the applicable basic tolerances during the disturbance.

(Amended 1997 and 20XX)

This is a tolerance for reaction to a disturbance and is properly expressed in e.

Group 7. Identify appropriate application of code sections (in order of appearance)

When the paragraph references d it is referring to the actual scale division and the concern is how the instrument operates. When the paragraph references e it is referring to the verification scale division and the concern is in classification of the instrument or in accuracy of the displayed values.

The sections in the table below currently correctly reference e or d as appropriate. The text of each section is not included for brevity. The justification may help explain the general rules above.

Code Section	Applies to	Justification
G-S.5.2.2.(c)	d	Rounding is a function of instrument operation not accuracy
G-S.5.2.2.(d)	d	Requires “d” to be an indicated zero and all digits to the left of “d” to be zero when $d < 1$. Requires “d” to be an indicated zero and all digits to the right of “d” to be zero when $d > 5$.
S.1.2.	d	1, 2, or 5 refers to d which is rounded. When $e \neq d$ refer to section S.1.2.2. for value of e.
S.1.2.1	d	Refers to rounded values of d.
S.1.2.3.	e	This is a classification issue. It ensures accuracy of the piece counts.
S.1.7.(b)	e	This is a classification issue addressing maximum indication above capacity.
S.2.1.2.	d	They must be in terms of d since stability of zero setting applies to d.
S.2.1.3.(all)	d	These limit the window for action of AZT. They must be in terms of d since zero setting applies to d.
S.2.3.	d	Tare division must equal smallest increment displayed.
T.N.7.	d	Discrimination requires an instrument to discriminate to the displayed scale division (zone of uncertainty). This relates to the rounding of the smallest increment.
UR.3.7.	d	Minimum load is correctly expressed in d. (see Group 5 above)
UR.3.10.	e	As written, this is clearly e. (See issues for additional study)

PART 3. Issues Identified as Requiring Additional Study (outside the scope of this workgroup)

A. The workgroup was in consensus that we should expand requirements in S.2.1.2. relating to semi-automatic zero to apply to all scales and not just scales used in direct sale. In first place, suitability is a User Requirement and not a specification. Second, correct operation to set zero should be applicable to all digital instruments as it is in R76.

B. The application of tolerances to net loads has always been assumed, even before the Scales Code adoption in 1984. Comparing T.2. for unmarked scales and T.N.2.1. for marked scales reveals important differences particularly regarding net loads. As written, T.N.2.1. exempts calculated net, but it appears to apply to both semi-automatic tare and preset tare. A comparison to R76 shows that OIML limits applicability of tolerances. Their MPE's do not apply to calculated net values or when preset tare (keyboard or programmed tare) is in operation (section 2.2). It appears net loads have MPE's applied only when the net zero is set in compliance with S.1.1.1.(b) which requires accuracy of zero to ¼ division. This cannot be assured with preset tare or when net is based on two gross values. This has further ramifications to any case where all three (gross, tare and net) values are indicated/recorded for a transaction. OIML requires the gross and net weights be accurate but does not apparently require that the equation gross – tare = net be in mathematical agreement due to rounding issues. Note that in most transactions, the customer only gets one or two of the gross, tare or net values. Rounding issues do not arise for this reason. This may impact a current issue before NCWM dealing with printing tare on POS transaction receipts. Consider a POS transaction where the customer saw 1.02 lb on the weight display and sees 1.00 lb net and 0.03 lb tare. These are all accurate weights (and correct per R76) but the numbers don't add up. The customer will claim they were overcharged by 0.01 lb since $1.02 \text{ lb} - 0.03 \text{ lb} = 0.99 \text{ lb}$.

C. The resolution of errors in testing scales was identified as an issue. The original proposal included a revision requiring resolution of error to at least 0.2 e. R76 specifically declares that errors be resolved to at least 0.2 e to eliminate rounding error. HB44 has no such provision and it might appear that rounding error is included in the tolerance. Instead of tolerance steps of 1, 2, etc., it could be argued that the tolerances are 1.5, 2.5, etc. as the result of direct reading. NTEP uses the R76 approach exclusively in testing, but it has no technical basis in the Code. There are obvious issues involved in using error weights in the field. The challenge is that you either eliminate rounding in determining tolerances or you don't. We have two standards at play at present. In addition, it can be argued that Class IIIIL instruments are already high resolution somewhat similar to Class I and II instrument with $e > d$. Class IIIIL devices have enough resolution to read errors to 0.2 e or 0.1 e of the equivalent Class III instrument without using error weight.

D. The UR.3.10. requirement that transactions from dynamic monorail scales be based on e raises issues. It was discussed since it involves both e and d. The displayed scale divisions equal to e (i.e. 10 d) are not normally rounded. If $e = 10 d$ then the rounding point is not 5 up/4 down, as it is for d, but rather 9.5 up/0.5 down. Does this requirement mean the scale design has to produce a properly rounded value for the transaction that may be different from the display, e.g. 943.7 lb to d of 0.1 lb now must be recorded for the transaction as 944 lb? In addition, in brief discussion, it seemed there were many ways this could be interpreted. The workgroup concluded it would be beneficial to open some discussions with USDA and the manufacturers to explore some of these questions. This also addresses similar issues to the proposal to delete S.1.2.2.2. where questions of using e or d are impacting high precision scales in cannabis and jeweler's sales.

