

WWMA Specifications and Tolerances (S&T) Committee 2023 Annual Meeting Addendum

Mr. Matt Douglas, Committee Chair
California

INTRODUCTION

- 1 The Specifications and Tolerances (S&T) Committee (hereinafter referred to as “Committee”) submits its Report to
2 the Western Weights and Measures Association (WWMA). The Report consists of the WWMA Agenda (NCWM
3 Carryover and NEW items) and this Addendum. Page numbers in the tables below refer to pages in this Addendum.
4 Suggested revisions to the handbook are shown in **bold face print** by ~~striking out~~ information to be deleted and
5 **underlining** information to be added. Requirements that are proposed to be nonretroactive are printed in **bold-faced**
6 *italics*.
7
8 Presented below is a list of agenda items considered by the WWMA and its recommendations to the NCWM
9 Specifications and Tolerances Committee.

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

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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 **SCL – SCALES**

2 **SCL-24.1 D S.1.7. Capacity Indication, Weight Ranges, and Unit Weights.**

SCL-24.1
<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>During the WWMA 2023 annual meeting the following comments were received: SMA has not had the opportunity to assess the item and will meet in November 2023.</p> <p>Steve Harrington – Oregon: Expressed confusion regarding terms in the proposed language. He recommended Developing as a status of this item.</p> <p>The State of California and two counties in California echoed the confusion expressed by Oregon.</p> <p>Kurt Floren - LA County: There is an existing definition for computing scales and this item may confuse these existing definitions. POS means Point of Sale not Point of Sale System and ECR means Electronic Cash Register which may not be interfaced with a weighing device. He would like more information from Rice Lake and/or SMA regarding this item. Agreed with Oregon on a Developmental status for this item.</p> <p>During open hearings testimony was received that the SMA has not evaluated this proposal. Comments were heard supporting a developmental status as the item needs further clarification on the terms and definitions in the item. The WWMA S&T Committee recommends that this item be assigned a Developing status. This will allow the submitter the opportunity to address the comments heard during the open hearings. The committee also looks forward to comments from the SMA and NIST OWM regarding this item.</p>

3

4 **SCL-24.2 D Multiple Sections Regarding Tare**

SCL-24.2

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
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(In the case of new proposals, do not forward this item to NCWM)
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(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)*

During the WWMA 2023 annual meeting the following comments were received:
SMA has not had the opportunity to assess the item and will meet in November 2023.

Steve Harrington – Oregon: Expressed concerns regarding terminology throughout the item but acknowledged that there is merit to the item. He recommends this item be separated by the appropriate sections that would correspond to the handbook and that the items be blocked together. He also recommends this item be assigned a developing status.

Kevin Schnepf – California: Echoed the comments from Oregon, supports a developing status, and looks forward to comments from the SMA.

The WWMA S&T Committee recommends that this item be assigned a Developing status. This will allow the submitter the opportunity to address the comments heard during the open hearings and receive feedback from stakeholders. The WWMA S&T Committee further recommends the items be separated and Blocked, specifically separating the scale code sections into one item and the definitions sections into a second item.

As a point of technical merit, proposed items are best presented when they are specific and clear for the body to evaluate the proposal accurately. This comment is in reference to specifically the alternative proposal of S.1.17 found on page S&T – 227 of the WWMA 2023 S&T Agenda. This committee recommends the submitter determine which version of S.1.17 best fits this proposal for merit and remove the other version.

1

2 **SCL-22.3 D UR.3.3. Single-Draft Vehicle Weighing., and UR.3.4. Axle and Axle Group**
3 **Weight Values.**

SCL-22.3

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

<p><i>(To be developed by an NCWM Task Group or Subcommittee)</i></p> <p><input checked="" 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>During the WWMA 2023 annual meeting the following comments were received: Loren Minnich – NIST OWM: SMA comments have been addressed and recommends this item is ready for a vote.</p> <p>Cory Hainy – SMA: Expressed the April 2023 analysis represents their position prior to the updates to the item and will reconvene in November 2023 to analyze the item. They support this item as developing status.</p> <p>Steve Harrington – Oregon: Supported development of this item. He raised concerns that the device may potentially be used inappropriately to capture vehicle gross weight and recommends adding a user requirement of posting on a sign or recording on a scale ticket be added to the item to address this concern.</p> <p>Kevin Schnepf – California: Supports a voting status contingent on SMA analysis of the item.</p> <p>The WWMA S&T Committee recommends that this item be assigned a Developing status to allow the submitter the opportunity to consider the comments heard on the floor and receive feedback from stakeholders.</p>	

1 SCL-23.3 I Verification Scale Division e: Multiple Sections Including, T.N.1.3., Table 6.,
 2 T.N.3., T.N.4., T.N.6., T.N.8., T.N.9., T.1., T.2., S.1.1.1., T.N.1.2., Table
 3 S.6.3.a., Table S.3.6.b., Appendix D, S.1.2.2., Table 3., S.5.4., UR.3., Table 8.

<p>SCL-23.3</p>	
<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 checked="" 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>During the WWMA 2023 annual meeting the following comments were received: Loren Minnich – NIST OWM: The NCWM Verification Scale Division e Task Group now has a chairman and has met to begin cleaning up the language in the item. The task group will make changes to Table 8 so that it</p>	

only references “verification scale division” (e). Requests this item be assigned an Informational status to receive feedback from the body of the NCWM.

Cory Hainy – SMA: Supports further development of this item with the consideration all references to “verification scale division” be changed to “verification interval”. The SMA will reconvene in November 2023 and requested this item to continue further development.

Kevin Schnepf – California: Echoed SMA with the request this item be assigned an Informational status.

The WWMA 2023 S&T Committee recommends this item be assigned an Informational status to allow the body of NCWM to provide feedback.

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

SCL-22.2
<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>During the WWMA 2023 annual meeting the following comments were received: Vince Wolpert – NCWM Cannabis Task Group Co-Chair: This item is still being developed by the task group and requested the item remain assigned to the task group.</p> <p>Kevin Schnepf – California: Questioned basing the suitability of a scale on the type of product. Recommended this item remain assigned to the task group.</p> <p>Steve Harrington – Oregon: Echoed California</p> <p>Kurt Floren – LA County: Referred to previous language of the item which stated weight ranges for the suitability of the device and the current language now references a product type. Recommended referring to the previous language of weight ranges. Commented Table 7a. is not enforceable and the item should remain assigned to the task group.</p> <p>Cory Hainy – SMA: Recommended a change of language in Table 7a. class III devices, replace the word “All Cannabis” with “non-retail Cannabis”. Recommend adding a comment in Table 7a. for reference to Table 8. for scale selection.</p> <p>Wendy Hahn – Stanislaus County California: Echoed LA County with an additional concern that the table is confusing and someone may select a class of device that may not be suitable.</p> <p>Aaron Yanker – Colorado Dept. of Agriculture Weights and Measures: Supports this item with the proposed changes heard on the floor.</p> <p>The WWMA 2023 S&T Committee recommends this item remain Assigned to the NCWM Cannabis Task Group and recommends the task group consider the comments heard during the open hearing.</p>

2 **AWS – AUTOMATIC WEIGHING SYSTEMS CODE**

3 **AWS-24.1 D N.1.5. Test Loads,**

AWS-24.1

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)*

During the WWMA 2023 annual meeting the following comments were received:

A question was raised by the WWMA S&T Committee directed to the submitter if the intent of reference to the number of runs of test loads will introduce repeatability tolerances. The committee did not receive a response during open hearings.

Steve Harrington – Oregon: Supports this item for a Voting status.

Cory Hainy – SMA: The association has not met on this item and intends to review it in the November 2023 SMA meeting.

Aaron Yanker – Colorado Dept of Agriculture Weights and Measures: Questioned the language of the types of tests, the definitions per the item, and the reference in Table N.4.2 referring only to the type evaluation and not the entire table. Recommended this item for Developing status.

Loren Minnich – NIST OWM: The current language as written in existing code is confusing and this item is an attempt to clarify that language.

Kevin Schnepf – California: Recommends this item be assigned a Developing status with pending review and position from the SMA.

The WWMA 2023 S&T Committee recommends this item be assigned a Developing status to allow the submitter the opportunity to receive input from stakeholders and address comments heard during open hearings. The committee further recommends this item, AWS-24.2, and AWS-24.3 be Blocked.

1 **AWS-24.2 D N.1.6. Influence Factor Testing.**

AWS-24.2	
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)	
<p>During the WWMA 2023 annual meeting the following comments were received: Cory Hainy – SMA: The association has not met on this item and intends to review it in the November 2023 SMA meeting.</p> <p>Kevin Schnepf – California: Recommends this item be assigned a Developing status with pending review and position from the SMA.</p> <p>The WWMA 2023 S&T Committee recommends this item be assigned a Developing status to allow the submitter to receive input from stakeholders. The committee further recommends this item, AWS-24.1, and AWS-24.3 be Blocked.</p>	

2

3 **AWS-24.3 D N.22.3. Shift Test (Dynamic)**

AWS-24.3	
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)	

During the WWMA 2023 annual meeting the following comments were received:

Cory Hainy – SMA: The association has not met on this item and intends to review it in the November 2023 SMA meeting.

Kevin Schnepf – California: Recommends this item be assigned a Developing status with pending review and position from the SMA.

Kurt Floren – LA County: Recommend this item be assigned a Developing status. He raised a concern that the existing requirement for a shift test load is 50% of the total scale capacity, he proceeded to question the reasoning behind the change in the shift test load to 1/3 of the total scale capacity.

The WWMA 2023 S&T Committee recommends this item be assigned a Developing status to allow the submitter to receive input from stakeholders. The committee further recommends this item, AWS-24.1, and AWS-24.2 be Blocked.

- 1 **WIM – WEIGH-IN-MOTION SYSTEMS – TENTATIVE CODE**
- 2 **WIM-23.1 I Remove Tentative Status and Amend Numerous Sections Throughout**

WIM-23.1

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
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- Recommend as a Developing Item on the NCWM agenda
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Comments and justification for the regional recommendation to NCWM: *(This will appear in NCWM reports)*

During the WWMA 2023 annual meeting the following comments were received:

A presentation was given from the submitters of this item regarding updated language provided for consideration and posted on the WWMA website, Events – Meeting Documents – WIM.23-1 Proposed Language. The submitters spoke to:

- This device is not a scale in the traditional application and intended for use dynamically of overweight vehicle enforcement.
- The intent is to remove the “Tentative” status for Class E devices. The “Tentative” status would remain for Class A devices.
- A demonstration was conducted on a similar device in April 2023.
- This application would exclude all liquid tank trucks.
- It is difficult to be consistent with vehicle positioning. The submitter clarified that if the vehicle is not in the correct position the system will default to “Error”. This “Error” is an appropriate performance function.

Cory Hainy – SMA: The association formed a position in April 2023 of opposition to this item prior to the updated language being proposed and will meet in November 2023 to reassess the item. It was reemphasized that the proposed tolerances were a point of contention with the association. The association would like to see revisions that address dynamic weighing should not be allowed a greater tolerance, acceptance and maintenance tolerances should be applied, and harmonizing existing tolerances with the scale code.

Loren Minnich – NIST OWM: OWM reached out to the submitter to clarify the intention regarding tentative and permanent status for “Class A” and “Class E” devices subject to this code. Examples were provided in open hearing of existing code such as Grain Analyzers as an example of separating this code for enforcement and screening purposes.

The committee posed the following questions:

- Can the submitter clarify the intent of all weights for 100% compliance regarding the applicable tolerances?
The submitter response clarified the device should perform within the applicable tolerances at all test loads and that a fault qualifies towards the 100% compliance.
- Can the submitter clarify what is meant by 100% compliance regarding T.2.4?
The submitter clarified the axle spacing must be predetermined by the inspector and must match the device. The system will identify a bridge formula violation and the inspector has to accurately measure the axle spacing and then verify the system measurement within the tolerance specified with T.2.4
- Can the submitter provide data to support the +/- 10% to 20% tolerance range?
The submitter response clarified the intent of the use of the device is for dynamic and not static weightment. Scales currently function at a lower range of 6% but the addition of the 100% compliance is to justify the tolerance. It was expressed the intention of the proposed code is to enforce grossly overweight vehicles.
The submitter clarified the 100% compliance came from the original proposed 95% compliance. The submitter clarified 100% of the total number of runs would need to be within tolerance.
- Can the body please clarify how or if 2.20 scale code regarding WIM systems and the proposed WIM system code will impact each other?
Loren Minnich – NIST OWM clarified each section of the existing code has an application section to identify what devices are covered by that code. The application section for each code should be reviewed to verify that there is no overlap.

Cory Hainy – SMA: Raised concern regarding tolerances specifically whether OIML R 134-1 standards were considered.

Chaekuk Na – Rutgers: OIML 134-1 standards were considered and that there are different levels of accuracy. The tolerances selected are currently being used in other countries and the F-10 for 10% gross meet the proposed tolerances.

Cory Hainy – SMA: Reinforced the concern regarding the large tolerances and spoke to already existing tolerances. Existing scales are held to certain standards even if used for law enforcement purposes.

Tanvi Pandya – New York DOT: Clarified this is a dynamic test and supports the tolerances as written.

Aaron Yanker – Colorado Dept. Ag Weights and Measures: Questioned the note in Table 1. The submitter responded the note regarding the higher accuracy class is original language of the item.

The WWMA S&T Committee recommends that the NCWM S&T Committee consider incorporation of the updated language as provided by the submitter and that this item remain Informational. This will allow stakeholders to provide comments on the updated language. We further recommend that NCWM S&T Committee consider the comments and questions which came up in the WWMA S&T open hearing session while further developing the item with special attention to the comments from NIST OWM.

Updated language will be included in the WWMA S&T Committee 2023 Final Report as an Appendix to the item.

1 **VTM – VEHICLE TANK METERS**

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

VTM-20.2
<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>During the WWMA 2023 annual meeting the following comments were received: Aaron Yanker – Milk Meter Tolerance Task Group: Updated the body, there is currently no Chairman of the task group and no updates provided.</p> <p>The WWMA 2023 S&T Committee recommends this item remain Assigned to the NCWM Milk Meter Tolerance Task Group for further development and look forward to a Chairman being assigned and an update provided. This committee also recommends this item be blocked with MLK-23.2.</p>

1 **LPG – LIQUIFIED PETROLEUM GAS AND ANHYDROUS AMMONIA LIQUID-**
 2 **MEASURING DEVICES**

3 **LPG-23.1 W S.2.5. Zero-Set-Back Interlock**

LPG-23.1	
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)	
<p>During the WWMA 2023 annual meeting comments were heard from California, Colorado, and Oregon supporting a Withdraw of this item in lieu of LPG-24.1, LPG-24.2, and OTH 24.1.</p> <p>The WWMA 2023 S&T Committee recommends this item be Withdrawn.</p>	

4 **LPG-24.1 D S.1.5.7. Retail Motor Fuel Dispenser Liquefied Petroleum Gas Retail Motor**
 5 **Fuel Device., S.2.6.1. Electronic Stationary (Other than Stationary Retail**
 6 **Motor Fuel Dispensers Liquefied Petroleum Gas Retail Motor Fuel Device).**
 7 **S.6.2. Automatic Timeout Pay-at-Pump Retail Motor Fuels Devices Liquefied**
 8 **Petroleum Gas Retail Motor Fuel Device. and, S.4.3. Location of Marking**
 9 **Information: Retail Motor Fuel Dispensers Liquefied Petroleum Gas Retail**
 10 **Motor Fuel Device.**

LPG-24.1	
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>	

<p>Comments and justification for the regional recommendation to NCWM: <i>(This will appear in NCWM reports)</i></p> <p>During the WWMA 2023 annual meeting comments were heard on LPG-24.1, LPG-24.2, and OTH-24.1 collectively:</p> <p>There was consensus of support for the items and a request to Block the three items. There were comments that this may be an opportunity to clarify existing language in HB 44 which some find confusing, and possibly merging S.2.5.1 and S.2.5.2. A question was also posed to the body to address the intent of the item by exempting analog devices from a Zero Set Back Interlock requirement.</p> <p>Based on the comments heard during the open hearings the WWMA S&T Committee recommends this item be Blocked with LPG-24.2 and OTH-24.1 and that the Blocked items be assigned a Developing status to allow the body an opportunity to review the new language and allow the submitter to address the comments heard during open hearings.</p>

1 **LPG-24.2** **D** ~~**S.2.5. Zero-Set-Back Interlock.**~~ **S.2.5. Zero-Set-Back Interlock.**

LPG-24.2
<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 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 checked="" 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>During the WWMA 2023 annual meeting comments were heard on LPG-24.1, LPG-24.2, and OTH-24.1 collectively:</p> <p>There was consensus of support for the items and a request to Block the three items. There were comments that this may be an opportunity to clarify existing language in HB 44 which some find confusing, and possibly merging S.2.5.1 and S.2.5.2. A question was also posed to the body to address the intent of the item by exempting analog devices from a Zero Set Back Interlock requirement.</p> <p>Based on the comments heard during the open hearings the WWMA S&T Committee recommends this item be Blocked with LPG-24.1 and OTH-24.1 and that the Blocked items be assigned a Developing status to allow the body an opportunity to review the new language and allow the submitter to address the comments heard during open hearings.</p>

1 **MLK – MILK METERS**

2 **MLK-23.2 A Table T.1. Tolerances for Milk Meters**

MLK-23.2
<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: <i>(This will appear in NCWM reports)</i></p> <p>During the WWMA 2023 annual meeting the following comments were received: Aaron Yanker – Milk Meter Tolerance Task Group: Updated the body, there is currently no Chairman of the task group and no updates provided.</p> <p>The WWMA 2023 S&T Committee recommends this item remain Assigned to the NCWM Milk Meter Tolerance Task Group for further development and look forward to a chairman being assigned and an update provided. This committee also recommends this item be blocked with VTM-20.2.</p>

3 **HGM – HYDROGEN GAS-MEASURING DEVICES**

4 **HGM-23.1 D UR.3.8. Safety Requirement**

HGM-23.1
<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 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 checked="" 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>

During the WWMA 2023 annual meeting the following comments were received:
 Kevin Schnepf – California: Data is being collected by CDFA-DMS and the California Air Resources Board. He requested this item remain developing until the data can be provided.

The WWMA 2023 S&T Committee recommends this item remain Developing based on comments heard to allow the submitter the ability to provide data and address the concerns of the 2023 WWMA S&T and 2023 NCWM S&T comments. This committee considered the comments recorded in the 2023 NCWM S&T Committee Interim Report in our analysis and echoes the concerns raised in the report on how this protocol affects performance in addition to safety.

1 **EVF – ELECTRIC VEHICLE FUELING SYSTEMS**

2 **EVF-24.1 D S.1.3. Mobile Device as Indicating Element for AC Chargers.**

EVF-24.1	
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: <i>(This will appear in NCWM reports)</i>	
<p>During the WWMA 2023 annual meeting the following comments were received: General comments were heard on the floor supporting a developing status of this item.</p> <p>Comments were also heard on the floor regarding concern with this item, in particular:</p> <ul style="list-style-type: none"> - Accessibility of the mobile device by the consumer (credit card payment vs. mobile payment app). - Use and responsibility of the device indication by consumer. - Code should apply to DC as well as AC chargers. - Code should only apply to those devices which require a mobile app to activate. - Addressing potential wireless connection issues that may occur. <p>The WWMA S&T Committee recommends that this item be assigned a Developing status to allow the submitter the opportunity to consider the comments heard on the floor and receive feedback from stakeholders.</p>	

3

1 **EVF-24.2** **V** **S.2.7. Indication of Delivery, N.5.2. Accuracy Testing., and T.2.1. EVSE**
 2 **Load Test Differences.**

EVF-24.2
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: (This will appear in NCWM reports)
<p>Due to the WWMA Committee Chairman being a submitter of this item, Matt Douglas – California Dept. of Food and Agriculture, Div. of Measurement Standards abstained from the committee during open hearing and committee work group.</p> <p>During the WWMA 2023 annual meeting the following comments were received: General comments from representatives of California and manufactures of the test equipment were heard on the floor in support of this item being moved forward as a Voting item.</p> <p>Scheleese Goudy – Electrify America: Questioned the meaning of the availability and lead time of the test equipment. Expressed the concern of how to address legacy devices that are already installed and being used.</p> <p>Francesca Wahl – Tesla: Echo Electrify America regarding the legacy device issue. Recommend this item be Developing status.</p> <p>Perry Lawton – Tesco: Clarified the availability of test equipment will be in the first quarter of 2024.</p> <p>Kevin Schnepf – California: Legacy devices can be addressed with “Non-Retroactive”.</p> <p>Chris King – Siemens: Concerned about the availability of the test equipment and recommends this item be Developing status.</p> <p>The WWMA S&T Committee recommends that this item be assigned a Voting status to allow the submitter the opportunity to consider the comments heard on the floor and receive feedback from stakeholders. This committee notes there are two items on the 2023 WWMA S&T agenda that propose changes to section T.2 Load Test Tolerances (EVF-23.6).</p>

3
 4 **EVF-23.4** **D** **S.5.2. EVSE Identification and Marking Requirements, S.5.3. Abbreviations**
 5 **and Symbols, and N.5. Test of an EVSE System.**

EVF-23.4

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)*

During the WWMA 2023 annual meeting:

The committee heard comments regarding item EVF-23.7 and this item. The WWMA S&T Committee received a letter with updated proposed language for this item and EVF-23.7. The letter has been posted to the WWMA website, Events – Meeting Documents – Letter From the Submitters EVF-23.4 and EVF-23.7. This letter has also been provided to NCWM S&T Committee.

Comments were heard supporting the proposed language in the Joint Letter dated August 22, 2023.

Kevin Schnepf – California: Supports this item with an additional proposed revision of changing the Exemption Date from 2028 to 2025.

The WWMA 2023 S&T Committee recommends this item be revised to reflect all proposed language in the Joint Letter dated August 22, 2023 and that the item remain Developing to allow all stakeholders availability to review all proposed changes. This committee recommends the withdrawal of item EVF-23.7 in favor of this item with the revisions per the letter.

The letter will be included in the WWMA S&T Committee 2023 Final Report as an Appendix to the item.

1 **EVF-23.6 D S.5.2. EVSE Identification and Marking Requirements., and T.2.**
 2 **Tolerances.**

EVF-23.6	
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 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)	
<p>During the WWMA 2023 annual meeting: Updated language to this item was provided to the WWMA S&T Committee and posted to the WWMA website. A presentation was given from the submitters of this item. The submitters spoke to:</p> <ul style="list-style-type: none"> - 5% tolerance for legacy devices - Marking requirement of class 5 based on comments received during the 2023 NCWM Annual Conference. <p>General comments from industry supported a Voting status with the updated language.</p> <p>Kevin Schnepf – California: Supports this item with the recommended revision of the Exemption Date from 2028 to 2025.</p> <p>Mahesh Albuquerque – CO Oil and Public Safety: Supports this item as Voting status.</p> <p>Comments from regulatory officials were heard regarding the concern of the language “placed into service” and the removal of the language of “Install” with the potential effect to “legacy devices” being used in the marketplace.</p> <p>Lenny Vang – EV Testing Solutions: Questioned where the data on the 5% tolerance resulted from and requested from the submitter the data to justify the 5% tolerance.</p> <p>Scheleese Goudy – Electrify America: Clarified the tolerances where originally aligned with California standards and existing devices in use.</p> <p>Questions were raised about whether the marking requirement of “Class 5” if fully informative to a consumer.</p> <p>The WWMA 2023 S&T Committee recommends this item be assigned a Developing status with the recommendation the submitter consider comments heard on the floor. This committee notes there are two items on the 2023 WWMA S&T agenda that propose changes to section T.2 Load Test Tolerances (EVF-24.2).</p> <p>Updated language will be included in the WWMA S&T Committee 2023 Final Report as an Appendix to the item.</p>	

1 EVF-23.7 W ~~N.1. No Load Test, N.2. Startin Load Test., N.5.2. Accuracy Testing, And~~
 2 Appendix D: maximum deliverable amperes.

EVF-23.7
<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>During the WWMA 2023 annual meeting: The committee heard comments regarding item EVF-23.4 and this item. The WWMA S&T Committee received a letter with updated proposed language for this item and EVF-23.4. The letter has been posted to the WWMA website, Events – Meeting Documents – Letter From the Submitters EVF-23.4 and EVF-23.7. This letter has also been provided to NCWM S&T Committee.</p> <p>Comments were heard supporting the proposed language in the Joint Letter dated August 22, 2023.</p> <p>Kevin Schnepf – California: Supports this item with an additional proposed revision of changing the Exemption Date from 2028 to 2025.</p> <p>The WWMA 2023 S&T Committee recommends this item be assigned a Withdrawn status in favor of item EVF-23.4. Based on comments heard during open hearings from industry and consideration of the Letter from the Submitters this committee recommends that EVF-23.4 be updated with the proposed language in the letter and EVF-23.7 be withdrawn.</p>

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

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

GMA-19.1	
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)	
During the WWMA 2023 annual meeting no comments were received from the body on this item. The WWMA 2023 S&T Committee recommends this item remain a Developing status based on comments heard and included in the 2023 NCWM S&T Committee Annual Report; those comments indicate data is being collected and reviewed.	

4 **OTH – OTHER ITEMS**

5 **OTH-16.1 I Electric Watthour Meters Tentative Code**

OTH-16.1	
Regional recommendation to NCWM on item status:	
<input type="checkbox"/> Recommend as a Voting Item on the NCWM agenda <input checked="" 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)	
During the WWMA 2023 annual meeting:	

The proposed language for consideration is posted on the WWMA website, Events – Meeting Documents – OTH-16.1 Recommended Edits Agenda Item. Comments heard on the floor were regarding the proposed updated language.

Austin Shepard – San Diego County California: Supports this item moving forward as a Voting item with the proposed changes as posted on the WWMA website.

Due to the substantial changes to the proposed language the WWMA S&T Committee recommends this item remain Informational to allow the body of the NCWM the opportunity to review those proposed changes and provide feedback to the NCWM S&T Committee. The committee further recommends the NCWM S&T Committee consider the updates provided by Andrew Kimura – Santa Cruz County California in their deliberations.

Updated language will be included in the WWMA S&T Committee 2023 Final Report as an Appendix to the item.

1 **OTH-24.1 D Appendix D, Definitions: liquefied petroleum gas retail motor-fuel device.**

OTH-24.1
<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>During the WWMA 2023 annual meeting comments were heard on LPG-24.1, LPG-24.2, and OTH-24.1 collectively: There was consensus of support for the items and a request to Block the three items. There were comments that this may be an opportunity to clarify existing language in HB 44 which some find confusing, and possibly merging S.2.5.1 and S.2.5.2. A question was also posed to the body to address the intent of the item by exempting analog devices from a Zero Set Back Interlock requirement.</p> <p>Based on the comments heard during the open hearings the WWMA S&T Committee recommends this item be Blocked with LPG-24.1 and LPG-24.2 and that the Blocked items be assigned a Developing status to allow the body an opportunity to review the new language and allow the submitter to address the comments heard during open hearings.</p>

1 **OTH-24.2 D Appendix D, Definitions: National Type Evaluation Program (NTEP) and**
2 **Certificate of Conformance (CC)**

OTH-24.2
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>During the WWMA 2023 annual meeting comments were heard from California, Arizona, and Oregon. The consensus was in support for the item as it is needed. Comments were also heard suggesting simplifying both definitions and possibly removing the language regarding policy.</p> <p>Based on the comments heard during the open hearings the WWMA S&T Committee recommends this item be assigned a Developing status and recommends the submitter address the comments heard during the open hearings.</p>

3

- 1 **ITEM BLOCK 1 (B1) TRANSFER STANDARD**
- 2 **B1-LMD-24.1 V ~~N.3.5.X. Field Standard Meter Test~~N.3.5.X. Transfer Standard Test.**
- 3 **B1-VTM-24.1 V ~~N.3.5.X. Field Standard Meter Test~~N.3.5.X. Transfer Standard Test.**
- 4 **B1-LPG-24.3 V ~~N.3.2. Field Standard Meter~~Transfer Standard Test.**
- 5 **B1-MLK-24.1 V ~~N.3.2. Field Standard Meter Test.~~N.3.2. Transfer Standard Test.**
- 6 **B1-MFM-24.1 V ~~N.3.2. Field Standard Meter~~Transfer Standard Test.**

ITEM BLOCK 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>Due to the WWMA Committee Chairman being a submitter of this item, Matt Douglas – California Dept. of Food and Agriculture, Div. of Measurement Standards abstained from the committee during open hearing and committee work group.</p> <p>During the WWMA 2023 annual meeting the following comments were received: Matt Douglas – California Dept. of Food and Agriculture, Div. of Measurement Standards: Clarified the intent of this item is to replace undefined terms with defined terms recently adopted at the 2023 NCWM Annual Conference.</p> <p>Based on comments from the floor there was consensus of the item moving forward as a Voting item. Clarifying questions were asked with sufficient responses during open hearing.</p> <p>The WWMA S&T Committee recommends this item be assigned a Voting status. In review of this item and based on comments heard from the body, this committee feels this item is fully developed, has merit, and meets the intended purpose of the item.</p>

7

Mr. Matt Douglas, California | Committee Chair

Mr. Ken Burt, San Luis Obispo County, California | Member

Mr. Aaron Yanker, Colorado Department of Agriculture | Member

Mr. Chad Pilie, Arizona | Member

Mr. Nathan Waldron, Nevada | Member

Mr. David Aguayo, San Luis Obispo County, California | NCWM Representative

Specifications and Tolerances Committee

APPENDIX A

Item SCL-23.3 – Final Report of the Verification Scale Division Task Group

Note: This appendix originally appeared for Item Block 2 - Define True Value For Use In Error Calculations, which was withdrawn and replaced by SCL-23.3 - Verification Scale Division e: Multiple Sections Including, T.N.1.3., Table 6., T.N.3., T.N.4., T.N.6., T.N.8., T.N.9., T.1., T.2., S.1.1.1., T.N.1.2., Table S.6.3.a., Table S.3.6.b., Appendix D, S.1.2.2., Table 3., S.5.4., UR.3., Table 8. The Committee decided to preserve the appendix, since it remains relevant to item SCL-23.3.

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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.

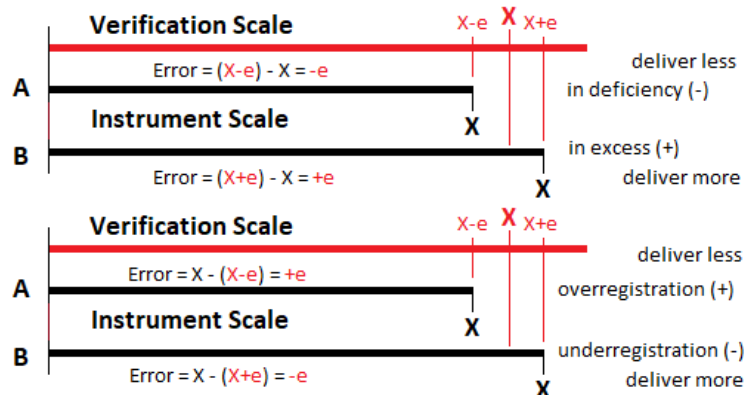
Instrument Scale	Scale div d	Verification “True Value” Scale	Scale div e	Relation e to d
Rule	1/16 in	Standard Rule or Tape	1/16 in	e = d
Taximeter	1/10 mi	Road Course	2 ft	e << d
LMD’s	0.1 gal	Prover indication	5 cu in	e > d
Mass Flow Meter	1 lb	Reference Scale	0.01 lb	e < d
Weighing Devices	0.01 lb	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.

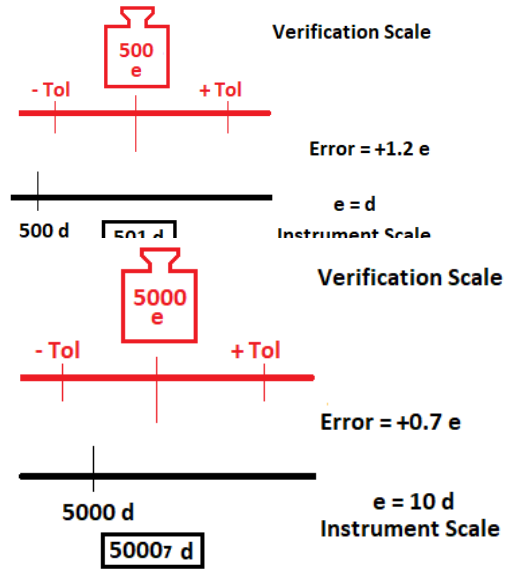
Error of delivery =
 verification scale – instrument scale
 + in excess
 – in deficiency

Error of Indication =
 instrument scale – verification scale
 + over registration
 – 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).

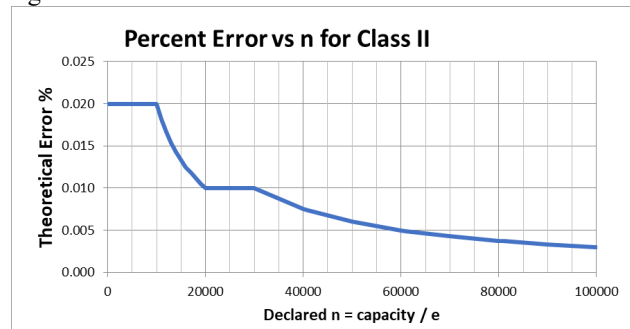
T.N.1.3. Scale Division. – The tolerance for a weighing device is related to the value of the scale division (d) or the value of the verification scale division (e) and is generally expressed in terms of d or e.

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]

$$n = \frac{Capacity}{e}$$

(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 (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. Parameters for Accuracy Classes			
Class	Value of the Verification Scale Division (d or e e¹)	Number of <u>Verification Scale</u>⁴ 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</i> ^{2,5}	<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 L</i> ³	<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>

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 no 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 ≠ 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 e to d	
<u>Type of device (see Note)</u>	<u>Relative magnitude of e to d</u>
<u>Graduated, without an auxiliary indicating device</u>	<u>e = d</u>
<u>Graduated, with an auxiliary indicating device</u>	<u>e > d and e is chosen by the manufacturer according to Table 3. and S.1.2.2.1.</u>
<u>Graduated, and marked for use in special applications (weight classifier)</u>	<u>e ≤ d and e is chosen by the 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 III 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 IIII Scales. On Class IIII 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 IIII where e should always equal d. Now all classes (I, II, III, IIII, and IIII) 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) $v_{min} \leq \frac{d^* e}{\sqrt{N} \times (\text{scale multiple})}$ 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 ≠ 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 +
III L	0 - 500	501 - 1 000	(Add 1 d e for each additional 500 d e 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 III L 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 III L, except that the tolerance for crane and construction materials hopper scales shall not be less than 1 e ~~d~~ 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 Scale Division “e”</u> (d or e*)	Recommended Minimum Load in scale divisions “d” (See notes) (d or e*)
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 ~~40 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 $\frac{1}{2}$ 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 ($0.05 \text{ g} / 1.05 \text{ g}$) 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 1/4 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.

