

National Type Evaluation Program (NTEP) Weighing & Belt Conveyor Scale Sector Meeting Summary

August 16, 2022; 9:00 pm to 5:00 pm, Weighing and Belt-Conveyor Scales

August 17, 2021; 8:00 pm to 5:00 pm Weighing and Belt-Conveyor Scales and Software Sector

August 18, 2021; 8:00 pm to 5:00 pm Software Sector (Weighing and Belt-Conveyor Scales members welcome)

Drury Plaza Hotel, 700 North Water Street, Milwaukee, Wisconsin

Introduction

The charge of the NTEP Weighing Sector is important in providing appropriate type evaluation criteria based on specifications, tolerances, and technical requirements of NIST Handbook 44 Sections 1.10. General Code, 2.20 Scales, 2.21 Belt-Conveyor Scale Systems, 2.22 Automatic Bulk Weighing Systems, and 2.24 Automatic Weighing Systems. The Sector's recommendations will be presented to the National Type Evaluation Program (NTEP) Committee each January for approval and inclusion in NCWM Publication 14 *Technical Policy, Checklists, and Test Procedures* for national type evaluation.

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

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

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Table B
Glossary of Acronyms and Terms

Acronym	Term	Acronym	Term
ABWS	Automatic Bulk Weighing Systems	NCWM	National Conference on Weights and Measures
AREMA	American Railway Engineering Maintenance-of-Way Association	NIST	National Institute of Standards and Technology
AWS	Automatic Weighing Systems	NTEP	National Type Evaluation Program
CC	Certificate of Conformance	OIML	International Organization of Legal Metrology
DES	Digital Electronic Scales	OWM	Office of Weights and Measures
HB 44	NIST Handbook 44	R	Recommendation
IZSM	Initial Zero-Setting Mechanism	SS	National Type Evaluation Program Software Sector
LMD	Liquid Measuring Device	S&T	Specifications and Tolerances Committee
MC	Measurement Canada	SMA	Scale Manufacturers Association
MRA	Mutual Recognition Agreement	WS	National Type Evaluation Program Weighing Sector

Details of All Items
(In order by Reference Key)

Carry-over Items

1. Recommended Changes to NCWM Publication 14 Based on Actions at the 2022 NCWM Annual Meeting

Items which were designated with a Voting status at the July 2022 NCWM Annual Meeting are listed below.

1.1. GEN-22.1, G.A.1. Commercial and Law Enforcement Equipment

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

- (1) To commercial weighing and measuring equipment; that is:
 - (a) To weights and measures and weighing and measuring devices commercially used or employed in:
 - 1. establishing the size, quantity, extent, area, composition (limited to meat and poultry), constituent values (limited to grain), or measurement of quantities, things, produce, or articles for distribution or consumption, purchased, offered, or submitted for sale, hire, or award;
 - 2. assessing a fee for the use of the equipment to determine a weight or measure;
 - 3. determining the basis of an award using count, weight, or measure; or
 - 4. computing any basic charge or payment for services rendered on the basis of weight or measure.
 - (b) To any accessory attached to or used in connection with a commercial weighing or measuring device when such accessory is so designed that its operation affects the accuracy of the device.
- (2) To weighing and measuring equipment in official use for the enforcement of law or for the collection of 24 statistical information by government agencies.

Recommendation:

This item was adopted by the NCWM Membership; however, this item has no impact on the information in Publication 14 and therefore no recommendation is necessary.

Discussion/Conclusion:

No action needed.

1.2. OTH-22.2, Handbook 44, Appendix D – Definition; face

face. – That portion of a computing-type pump or dispenser which displays the actual computation of price 33 per unit, delivered quantity, and total sale price. In the case of some electronic displays, this may not be an 34 integral part of the pump or dispenser. [3.30, 3.32, 3.37, and 3.39

(Added 1987) (Amended 2022)

Recommendation:

This item was adopted by the NCWM Membership; however, this item has no impact on the information in Publication 14 and therefore no recommendation is necessary.

Discussion/Conclusion:

No action needed.

2. Verifying the Performance Adequacy of a Reference Scale and Recommendations for Amendments to Publication 14 for Belt Conveyor Scales

Source:

NIST OWM's Legal Metrology Devices Group

Background:

During a 2016 meeting of the USNWG on BCS, the USNWG recognized that there has been a difference of opinion in the interpretation of tolerance application among regulatory officials, manufacturers, and users of belt-conveyor scale type systems. The work group confirmed through their discussions that the tolerance prescribed in Handbook 44 Section 2.21. are being applied to the range of test run results by some evaluators as a “plus or minus” tolerance while others are taking a more conservative position and applying the tolerance as an absolute value. This lack of clarity in the Belt-Conveyor Scale Systems Code and the difference in interpretation of how the tolerance is to be applied was identified as a source of inconsistency in the regulation of this type of dynamic weighing systems. Since the USNWG recently amended the Belt-Conveyor Scale Systems Code to recognize systems that operate using multiple rates for the flow of material, this inconsistency was considered to be a significant issue that the work group should address.

The USNWG consulted past records of work group meetings, NTEP Sector meetings, and NCWM conference reports, along with other resources in attempts to determine the correct and intended application of the allowable variation between consecutive test runs when material tests are conducted. The USNWG was unable to arrive at any definitive conclusion on this issue through this research but they agreed it is necessary to amend the Belt-Conveyor Scale Systems Code to clearly identify the proper application of tolerances under specific sets of test conditions.

After lengthy discussion and much deliberation, the USNWG arrived at a consensus and agreed the existing tolerance should be applied as an absolute value when comparing test results performed under practically identical conditions (referring primarily to the flow rate of material). They also concluded that when comparing test results from test 1 runs performed under different conditions, the tolerance should be applied as a plus or minus value to the range of 2 test results.

The changes included in the attached proposal are intended to clarify how the prescribed tolerances are to be applied when comparing totalization operations during material tests on a “belt-conveyor scale system” or a “weigh-belt system.” The recommended changes will specify the application of tolerances when material test runs are performed under practically identical conditions, and the proper application of tolerances when those test runs are performed under different conditions.

During deliberations on the issue of how tolerances are to be applied in a comparison of material test results, the USNWG acknowledged that advances in design and technology have resulted in belt-conveyor scale systems and weigh-belt systems capable of performing within more stringent tolerances. The work group also recognized that the international recommendation OIML (R50) incorporates different accuracy classes for these types of systems.

It was also noted the Handbook 44 Scales Code (Section 2.20.) incorporates different accuracy classes for weighing devices regulated under that code. The members of the work group agreed there were benefits to introduce different accuracy classes for belt-conveyor scales and weigh-belt systems in Handbook 44 Section 2.21., believing that adding another accuracy class of dynamic weighing systems would provide more alternatives for determining the weight of various products in a wider array of commercial applications.

The additional changes in this proposal recommending the introduction of two different accuracy classes would retain the existing performance requirements (0.25 % relative to the weight of reference material used) and add a second accuracy class for devices/systems capable of complying with more stringent performance requirements (0.1 % relative to the weight of the reference material). In addition to introducing a new accuracy class with a smaller tolerance, other changes are included in this proposal to accommodate the addition of a second accuracy class. This proposal also recommends changes to account for differences in minimum scale division size, marking requirements, minimum test load size, and requirements pertaining to zero-tests (see attached document). These changes to the U.S. standards will harmonize more closely with international recommendation OIML R50 and bring the Belt-Conveyor Scale Systems Code in alignment with certain requirements in the Scales Code in Handbook 44. There may be opposing arguments from some that do not support allowing a “plus or minus” application of tolerances to the range of results from consecutive material test runs when those runs are performed under different flow rates.

In proportion to the number of these types of systems in commercial use, there are relatively few systems that are installed in a manner with the intent and/or ability to alter the flow rate of material.

Ensuring compliance with the provisions outlined in Section 3.2. in the Fundamental Considerations of Handbook 44 may prove challenging in some installations, depending upon the available equipment for weighing reference materials and conducting the test of the belt-conveyor scale system or weigh-belt system. The USNWG has received information however, from a device manufacturer (and member of the USNWG) that has demonstrated that these requirements are achievable.

At the 2019 NCWM Annual Meeting, the NCWM adopted amendments to the Belt-Conveyor Scales Systems (BCSS) Code, including adding a new Accuracy Class 0.1 and accompanying Note paragraph that requires the quantity of material used to conduct a material test on a Class 0.1 BCSS to be weighed on a reference scale to an accuracy within 0.035% (which equates to 0.35 lb/1,000 of test load). The tolerance to be applied to an Accuracy Class 0.1 BCSS is +/- 0.1% of the test load. OWM has some questions regarding the means of verifying the accuracy of some scales using procedures that will ensure when those scales are used to weigh material for a material test of a Class 0.1 BCSS, the actual mass of the material is within the 0.035% specified. Mr. John Barton (NIST OWM) and Mr. Rick Harshman (NIST OWM) will provide an overview of some test procedures being developed by OWM that can hopefully be used to confirm the adequacy of the reference scale (when used as a mass comparator) so that the scale can then be used to weigh reference material to within the 0.035% accuracy specified.

Although the NTEP Belt-Conveyor Scale Sector will be considering recommended changes to the Belt-Conveyor Scale and Weigh-Belt Systems portion of NCWM Publication 14 in the near future, it is thought members of the Weighing Sector might find this topic of interest because reference scales are used in other applications and may need to be tested similarly to determine their adequacy for use in weighing material. For example, reference scales are used to verify the performance of CNG Retail-Motor Fuel Dispensers.

Discussion/Conclusion: Belt Conveyor Scale Sector members in attendance at the October 29, 2019 meeting were notified that changes being recommended for NCWM Publication 14 were posted on the NCWM’s website approximately two weeks prior to the meeting. Not all members at the Sector meeting had the opportunity to complete a full review of those recommended changes. Those Sector members agreed they would complete their review and provide any comments regarding edits or other changes by Friday, November 1, 2019. Those comments would be provided to NIST technical advisor who would then incorporate any necessary changes and forward the amended recommendations to the NTEP Administrator prior to the November 15th deadline. No significant changes were recommended by members attending the October 29, 2019 Sector meeting.

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During the 2019 Weighing Sector Mr. John Barton (NIST OWM) provided an overview of some of the changes that were adopted at the 2019 NCWM Annual Meeting affecting the Belt-Conveyor Scales Systems (BCSS) Code. Most notably are new requirements intended to address a 0.1 Accuracy Class BCSS. As its accuracy class implies, the tolerance to be applied to a 0.1 Accuracy Class BCSS will be $\pm 0.1\%$ of the test load, which is the level of accuracy some manufacturers of weigh-belts (a type of belt-conveyor scale system) are claiming their systems can meet. Measurement Canada has evaluated at least one of these systems and found its performance to be within the specified tolerance.

A new Notes paragraph being added to the BCSS Code in 2020 requires the quantity of material used to conduct a material test on a 0.1 Accuracy Class BCSS to be weighed on a reference scale to an accuracy of 0.35 %. This item was added to the Weighing Sector's 2019 agenda to solicit input from members on how best to establish the test loads needed to be able to test these systems in a field environment given the degree of accuracy required of the material. Scales performing to within this level of accuracy (0.035%) may not be available or the procedures typically used to verify the accuracy of some scale types may not be adequate to ensure that when product for a material test is weighed on those scales it will be within the 0.035% specified. For example, a section test on a vehicle scale using 25 000 lb of certified test weight and each section determined to be within 0.035% of the applied test load doesn't ensure axle-loads of vehicles positioned on these same sections weighing 35 000 lb will also be within 0.035% of their true value. Additionally, influences from environmental conditions may result in the need to postpone tests to a time when more favorable conditions exist. Measurement Canada's testing of one of these systems involved using a static railroad scale as a mass comparator and two test cars of known mass; one approximately equal to the weight of an empty railcar, and the other, approximately equal the weight of a railcar filled with material.

NTEP may soon begin receiving applications for type evaluations of these higher accuracy (0.1%) BCSSs. It too will need test procedures for verifying the adequacy of a reference scale used to weigh the material used for testing these higher accuracy systems. Current NCWM Publication 14 BCSS procedures for verifying the adequacy of a reference scale are intended for reference scales used to weigh product for a material test of BCSS having an applicable tolerance of $\pm 0.25\%$. These current procedures are inadequate for use in verifying the adequacy of a reference scales used for weighing product for a material test of a BCSS system with a $\pm 0.1\%$ applicable tolerance.

The development of adequate test procedures for the reference scale will be a main focus of an upcoming meeting of the NTEP Belt-Conveyor Scale Sector. The meeting is planned for October 2019.

During the discussion of this item, Mr. Pascal Turgeon (Measurement Canada) and Mr. Zach Tripoulas (MD NTEP evaluator) offered to provide assistance in the development of the procedures.

2020 Weighing Sector Meeting:

During the 2020 WS Meeting, Mr. John Barton (NIST, OWM) updated the participants on the ongoing efforts of addressing the best approach to defining the needs and performance level of a reference scale needed to perform testing on a Class 0.1 Belt Conveyor Scale. Mr. Barton also mentioned his appreciation for the information and documentation sharing offered by Measurement Canada. Mr. Barton reported that he hopes to hold a meeting of the work group in the late September time frame to keep this item moving forward.

2021 Weighing Sector Meeting:

John Barton provided background information related to the need for the development of a test procedure for the use of a reference scale to weigh material that will be used for the evaluation and testing of a belt-conveyor scale designed to perform to the new Class 0.1 tolerance. Peter Sirrico provided an overview of the test procedure used to evaluate this type of instrument. John Barton commented that he is heading up a Work Group charged with researching possible ways to use existing an scale as a reference scale while maintaining confidence that the accuracy of the reference material is held to the required value of 1/3 of the applied tolerance.

John Barton asked if anyone would be willing to participate in the Work Group. Eric Golden (Cardinal Detecto), and Kevin Chesnutwood (NIST Force Group) offered to participate in the Work Group. Pascal Turgeon (Measurement Canada) offered to share the Measurement Canada EPO and any supporting documentation from either him or Ron Peasley (Measurement Canada).

The item remains on the Weighing Sectors Agenda as a Carry Over Item for the 2022 Weighing Sector Meeting.

2022 Weighing Sector Meeting:

The members present agreed that this item is important to the testing of a belt-conveyor scale operating at the 0.1% tolerance level. The members also agreed that the item requires additional work and agreed to keep the item on the Weighing Sector Agenda for the 2023 meeting.

3. Discussion regarding Load Cell Capacities and v_{min} Values on NTEP Certificates of Conformance

Source:

Cardinal Scale Manufacturing Company

Background:

Mr. Eric Golden (Cardinal Scale Manufacturing Co.) introduced the idea of creating a method to allow the elimination of the table listed on the NTEP Certificate of Conformance (CC) that mentions specific technical specification such as capacity and v_{min} .

Discussion/Conclusion:

Mr. Golden pointed out that a capacity range is mentioned in the For: box of a CC, however; the table in the Standard Features and Options box lists specific capacities. In the event that a manufacturer wants to build a capacity that is within the capacity range in the For: box but not listed in the table, the manufacturer must submit an application to add this single capacity to the table.

Mr. Darrell Flocken (NTEP Administrator) mentioned that NTEP has no policy specifically stating the need for the table, however; the v_{min} value listed in the table, by device capacity, is needed to permit field officials to confirm the use of the proper load cell or load cell replacement when determining suitability of the load cell using the v_{min} Relationship Formula in Handbook 44, Scales Code, Paragraph S.5.4.

Mr. Golden explained that OIML has a method that allows the v_{min} value to be calculated using other specifications of the load cells performance. Using this method eliminates the need for the table listing each capacity and its associated v_{min} value.

Mr. Golden asked for volunteers to work with him to develop a proposal to remove the need for the table. The following individuals agreed to participate:

Scott Davidson	Mettler-Toledo, LLC
Darrell Flocken	NCWM
Andy Goddard	Marel
Jan Konijnenburg	Rice Lake Weighing Systems, Inc.
Rob Upright	VPD Transducers

Note: NTEP can support this work group by offering the use of the NCWM Zoom meeting scheduling capabilities.

2021 Weighing Sector Meeting:

Eric Golden reported that no activity has occurred since the 2020 Weighing Sector Meeting. He also mentioned that he felt this project still had merit and would like to keep it alive. He asked the existing members of the Work Group if they were still interested in continuing on as participants and if any new individuals were interested in participating. All current members agreed to continue, and Ben Raham (WIPOTEC-OCS) agreed to participate.

The item will remain on the Weighing Sectors Agenda as a Carry Over Item for the 2022 Weighing Sector Meeting.

2022 Weighing Sector Meeting:

The chair reported that the submitter of this item is no longer in the scale industry and no meetings of the work group were held. Several manufacturers agreed that the idea of having a formula to determine the v_{min} value is a good idea but questioned the need for the change to the current process. Additional comments were received stating that the current load cell testing, performed by the NIST Force Group, does not collect the necessary performance value required by the formula to calculate the v_{min} value in the field.

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While the members agreed that the item has merit, no one came forward to take over the leadership of the work group. Seeing this, it was agreed that no action would be taken on this item and the item would be removed from the Weighing Sector Agenda.

4. Discussion on Use of Vehicle and Axle-Load Scales in Charging Service Fees

Source:

NIST-OWM

Background:

Mr. Rick Harshman (NIST, OWM) discussed a new proposal submitted to the Regional S&T Committees addressing the use of a vehicle and axle-load scales when charging a service fee.

Discussion/Conclusion:

Mr. Harshman explained that this is a developing item and was interested in any comments or feedback the meeting participants may have on the subject. Several members provided comments. Additional comments, or questions should be directed to Mr. Harshman.

2021 Weighing Sector Meeting:

John Barton reported that NIST OWM has submitted a Form 15 into the 2021/2022 proposal cycle. John Barton provided a brief description of the recommendations in the proposal and would send a copy of the Form 15 to Darrell Flocken to be displayed during the Wednesday's Weighing Sector session.

Received the Form 15 from John Barton and displayed on Wednesday morning where John provided a more detailed overview of the proposal. It was mentioned that this item will be included in the S&T Committee agenda of the four Regional Weights and Measures Association Meetings at which time there will be an opportunity to provide comments.

The item will remain on the Weighing Sectors Agenda as a Carry Over Item for the 2022 Weighing Sector Meeting.

2022 Weighing Sector Meeting:

No one was available to provide an update on this item. The item will remain on the Weighing Sectors Agenda as a Carry Over Item for the 2023 Weighing Sector Meeting. If no update is provided during the 2023 meeting, the item will be removed from the Weighing Sector's Agenda.

NEW ITEMS

5. Weigh-in Motion Single Draft Vehicle Scale Testing – Test Vehicle Selection

Source:

NTEP Administrator

Background:

This proposal is intended to add the requirement that one of the test vehicles used during the evaluation of an weigh-in motion, single draft, vehicle scale be required to be a tanker truck. The proposal is not intended to add the requirement of a fourth vehicle, but to require that one of the current Class of vehicle be a liquid tanker truck.

The number of internal baffles are mentioned but open to discussion.

Recommendation:

1.1.1. Reference Vehicles

Select the Reference Vehicles that will be established as test objects. The criteria for choosing the Reference Vehicles include:

1. At least three (3) different vehicle types representing US Federal Highway Administration Class 9 (~~typical semi-tractor trailer~~), Class 6, (~~typical dump truck~~) and Class 5 (~~typical box truck~~) are required. **One of the vehicle types shall be a liquid tanker with a minimum number of internal baffles for the type liquid carried by the vehicle.** Multiple vehicles representing the same truck class may be used to avoid having to load/unload vehicles during the test. A heavy-duty test truck normally used for vehicle scale testing may be used for its corresponding class.
2. Each of the three (3) different vehicle types must be loaded to three (3) different load conditions:
 - an empty load condition,
 - a fully loaded condition (>90% of the scale capacity or >90% of the maximum capacity of the vehicle, whichever is less), and
 - a half loaded condition approximately between the empty and fully loaded condition.
3. Ensure each vehicle can be weighed in a single draft on the scale.

Discussion/Conclusion:

After the meeting agenda was finalized, Mettler-Toledo, LLC submitted a draft of three changes to Pub 14 for the evaluation of the WIM Single Draft Scale. The members agreed to review the changes proposed by Mettler-Toledo, LLC.

Proposed Change 1:

Amend paragraph 8.4.i. as shown below.

Restriction on the US Federal Highway Administration vehicle class to only the vehicle classes tested if testing on the three required vehicle classes, **including shifting load vehicles (i.e. tankers)**, cannot be fulfilled.

Proposed Change 2:

Amend paragraph 62.2.2.1. as shown below.

At least three (3) different vehicle types representing US Federal Highway Administration Class 9 (typical semi-tractor trailer), Class 6 (typical dump truck) and Class 5 (typical box truck) are required. Multiple vehicles representing the same truck class may be used to avoid having to load/unload vehicles during the test. A heavy-duty test truck normally used for vehicle scale testing may be used for its corresponding class. **At least one vehicle must be a vehicle with a shifting load (i.e. tanker). The shifting load vehicle may be an additional vehicle or one of the minimum three. If it is an additional vehicle, it does not need to complete the three loading conditions, but it must be loaded such that each compartment is loaded to approximately half capacity.**

Proposed Change 3:

Amend the new paragraph 69.3.12. as shown below.

<u>69.3.12. The vehicle stops on the scale and the system responds in a controlled manner as defined by the manufacturer.</u>	<input type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> N/A
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Recommended test procedure:

Using one of the Reference Vehicles, instruct the driver to stop on the scale. The vehicle speed must be within the speed range and as constant as possible before coming to a stop on the scale. Repeat this test at least twice to ensure the system response is consistent.

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Conclusion:

The membership reviewed and agreed to adopt the three proposed amendments shown above.

6. Price Calculation Checklist

Source:

NTEP Laboratory Meeting

Background:

It was pointed out that the price calculation table in the Checklist for Digital Electronic Scales is different than the price calculation table in the Checklist for Electronic Cash Registers Interfaced with Scales.

Table from the Checklist for Digital Electronic Scales

14.10. All indicated and recorded digital money values shall be in mathematical agreement with their associated quantity representations to the nearest one cent. The following table of suggested weight and unit prices is provided for evaluating computing scales and point-of-sale systems.

Net Weight	Unit Price	Total Price	Correctly Rounded	Net Weight	Unit Price	Total Price	Correctly Rounded
0.04 lb	\$.12	\$.0048	\$.00	2.54 lb	\$.79	\$2.0066	\$2.01
0.04 lb	\$.13	\$.0052	\$.01	2.54 lb	\$.86	\$2.1844	\$2.18
0.045 lb	\$.11	\$.00495	\$.00	2.54 lb	\$3.99	\$10.1346	\$10.13
0.045 lb	\$1.01	\$.04545	\$.05	2.54 lb	\$4.25	\$10.7950	\$10.79 or \$10.80
0.10 lb	\$.04	\$.0040	\$.00	2.54 lb	\$99.99	\$253.9746	\$253.97
0.10 lb	\$.05	\$.0050	\$.00 or \$.01	12.54 lb	\$2.25	\$28.2150	\$28.21 or \$28.22
0.10 lb	\$.15	\$.0150	\$.01 or \$.02	12.54 lb	\$99.99	\$1253.8746	\$1253.87
0.31 lb	\$.85	\$.2635	\$.26	12.545 lb	\$1.99	\$24.96455	\$24.96
0.31 lb	\$.89	\$.2759	\$.28	12.545 lb	\$2.89	\$36.25505	\$36.26
0.315 lb	\$2.49	\$.78435	\$.78	15.03 lb	\$1.83	\$27.5049	\$27.50
0.315 lb	\$3.00	\$.94500	\$.94 or \$.95	20.67 lb	\$.59	\$12.1953	\$12.20
0.32 lb	\$.83	\$.2656	\$.27	24.51 lb	\$.89	\$21.8139	\$21.81
0.32 lb	\$.89	\$2848	\$.28	1.00 lb	3 lb/\$1.00	\$.33333	\$.33
1.51 lb	\$.07	\$.1057	\$.11	2.00 lb	3 lb/\$1.00	\$.6666	\$.67
1.51 lb	\$.70	\$1.057	\$1.06	3.00 lb	3 lb/\$1.00	\$1.00000	\$1.00
1.51 lb	\$7.00	\$10.570	\$10.57	1.00 lb	3 lb/\$.89	\$.296666	\$.30
2.50 lb	\$.69	\$1.725	\$1.72 or \$1.73	2.00 lb	3 lb/\$.89	\$.59333	\$.59
2.50 lb	\$79.29	\$198.225	\$198.22 or \$198.23	3.00 lb	3 lb/\$.89	\$.89000	\$.89
				4.09 lb	2 lb/\$1.89	\$3.86505	\$3.87
				4.10 lb	2 lb/\$1.89	\$3.87450	\$3.87

Table from the Checklist for Electronic Cash Registers Interfaced with Scales

- 9.2. If credit can be given on weighed items and the credit is based upon reweighing an item, the price calculations shall be rounded to the nearest cent. Check both split-priced and unit priced items.

Weight Items

Price calculations for weighed items, including those that are split-priced, are required to be rounded to the nearest cent **according to the requirements as stated in Handbook 44**. Sample calculations to be checked are given below:

Net Weight (lb)	Unit Price (lb)	Total Price	Correctly Rounded
0.00	\$1.00	\$0.000	\$0.00
0.10	0.04	0.0040	0.00
0.10	0.05	0.0050	0.00 or 0.01
0.10	0.15	0.0150	0.01 or 0.02
0.31	0.82	0.2542	0.25
0.31	0.85	0.2635	0.26
0.31	0.89	0.2756	0.28
0.32	0.83	0.2656	0.27
0.32	0.89	0.2848	0.28
1.51	0.07	0.1057	0.11
1.51	0.70	1.057	1.06
1.51	7.00	10.570	10.57
2.50	79.29	198.225	198.22 or 198.23
2.54	0.79	2.0066	2.01
2.54	0.86	2.1844	2.18
2.54	3.99	10.1346	10.13
2.54	99.99	253.9746	253.97
12.54	99.99	1253.8746	1253.87
15.03	1.83	27.5049	27.50
20.67	0.59	12.1953	12.20
24.51	0.89	21.8139	21.81

Split Pricing

Net Weight (lb)	Unit Price (lb)	Total Price	Correctly Rounded
1.00	3/\$1.00	\$0.33333	\$0.33
2.00	3/\$1.00	0.6667	0.67
3.00	3/\$1.00	1.00000	1.00
1.00	3/\$0.89	0.29666	0.30
2.00	3/\$0.89	0.59333	0.59
3.00	3/\$0.89	0.89000	0.89
4.09	2/\$1.89	3.86505	3.87
4.10	2/\$1.89	3.87450	3.87

Recommendation:

No specific recommendation is being made. The Sector members are asked to review the examples in the two tables, and if agreed that only one table should exist, make a recommendation as to the one that should be used in both Checklists.

Discussion/Conclusion:

The membership agreed with the idea of having only one table containing pricing examples. It was agreed that the following three changes should be made to the appropriate Checklists.

2022 NTEP Weighing & Belt-Conveyor Scale Sector Agenda

Change 1:

In the DES Checklist remove the table in paragraph 14.10 and make the following changes to the wording in the same paragraph.

- 14.10. All indicated and recorded digital money values shall be in mathematical agreement with their associated quantity representations to the nearest one cent. **Refer to the table in the ECR Interfaced with Scale Checklist, paragraph 9.2 for suggested weight and unit prices is provided** for evaluating computing scales and point-of-sale systems.

Change 2:

In the ECR Checklist make the following changes to the wording in paragraph 9.2 and the changes to the three examples in the table.

Weight Items

Price calculations for weighed items, including those that are split-priced, are required to be rounded to the nearest cent **according to the requirements as stated in Handbook 44**. Sample calculations to be checked are given below:

Net Weight (lb)	Unit Price (lb)	Total Price	Correctly Rounded
0.00	\$1.00	\$0.000	\$0.00
0.10	0.04	0.0040	0.00
0.10	0.05	0.0050	0.00 or 0.01
0.10	0.15	0.0150	0.01 or 0.02
0.31	0.82	0.2542	0.25
0.31	0.85	0.2635	0.26
0.31	0.89	0.2756	0.28
0.32	0.83	0.2656	0.27
0.32	0.89	0.2848	0.28
1.51	0.07	0.1057	0.11
1.51	0.70	1.057	1.06
1.51	7.00	10.570	10.57
2.50	79.29	198.225	198.22 or 198.23
2.54	0.79	2.0066	2.01
2.54	0.86	2.1844	2.18
2.54	3.99	10.1346	10.13
2.54	99.99	253.9746	253.97
12.54	99.99	1253.8746	1253.87
15.03	1.83	27.5049	27.50
20.67	0.59	12.1953	12.20
24.51	0.89	21.8139	21.81

Change 3:

In the AWS Checklist make the following change to paragraph 14.1. and remove existing table.

- 14.1. All indicated and recorded digital money values shall be in mathematical agreement with their associated quantity representations to the nearest one-cent. ☐ Yes ☐ No ☐ N/A

~~The following table of suggested weight and unit prices is provided for evaluating weigh/price labelers. Refer to the table in the ECR Interfaced with Scale Checklist, paragraph 9.2 for suggested weight and unit prices for evaluating weigh/price labelers.~~

7. Permanence Testing – Laboratory Permanence Test

Source:

NTEP Laboratory Meeting

Background:

Current test requirements state that the test is 100 000 weight and instructs the evaluator to stop the test at the 25 000, 50 000, and 75 000 weightings and perform an increasing/decreasing load test. (A final increasing/decreasing load test is performed after the completion of the 100 000 weightings. (This adds additional work that seems to have little or no real value.

The Sector Members are asked to consider removing the requirement to perform the increasing/decreasing load test at the 25 000, 50 000, and 75 000 weighting points. increasing/decreasing load tests will still be performed before the beginning and at the completion of the Permanence test.

Recommendation:

63.5. Laboratory Permanence Tests (applicable only to instruments up to and including 2000 lb capacity)

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Steps

1. Energize the electronic weighing instrument and verify that all operational and metrological requirements are within the specified limits.
2. Adjust the instrument as close as possible to zero.
3. Conduct a normal test with at least four different test loads to maximum capacity and record the data. The test loads should include the maximum test load at each tolerance value level.
4. Apply a test load of 50% capacity, not to exceed 250 kg (550 lb), approximately ~~25 000~~ 100 000 times. It is recommended that the frequency and speed of application of the load shall allow the instrument to come to rest both when loaded and unloaded.

~~5. Repeat step 3.~~

~~65. Repeat steps 4 and 5 three more times until 100 000 weight applications have been recorded. If the device does not meet these tolerance limits, the entire test must be repeated, including successful initial performance testing and a repeat of the permanence test cycling.~~

Discussion/Conclusion:

The sector members reviewed and agreed to the recommended change.

8. Load Cell Sample Size Selection for Testing

Source:

NTEP Administrator

Background:

There is a difference between the OIML-CS and NTEP selection criteria for selecting the number of samples needed when performing the NTEP certification testing. The OIML-CS (R 60) selection process only requires the testing of one load cell for certification use in single or multiple load cell applications. While the NTEP selection process states that if only one load cell is tested, this load cell is only certified for a single load application, and two load cells have to be tested for the load cell to become certified for multiple load cell applications.

It seems to me that the testing of one load cell should be sufficient to obtain certification for both single and multiple load cell applications. My rationale for this is:

1. The tolerance applied during testing if the load cell is intended for only single load cell applications is smaller than the tolerance applied during the testing of a load cell for multiple load cell applications.
2. Handbook 44, Scales Code. Table S.6.3.b. Notes for Table S.6.3.a. Marking Requirements, Note 7, includes the statements:
 - "It is acceptable to use a load cell with the "S" or Single Cell designation in multiple load cell applications as long as all other parameters meet applicable requirements." and
 - "A load cell with the "M" or Multiple Cell designation can be used only in multiple load cell applications.
3. Publication 14, Load Cells, Chapter E. states:
 - "It is acceptable to use a load cell with the "S" or Single Cell designation in multiple load cell applications as long as all other parameters meet applicable requirements."
4. Publication 14, Load Cells, Chapter F. states:
 - "A load cell with the "M" or Multiple Cell designation can be only used in multiple load cell applications."
5. R 60 permits the load cell to be used in single or multiple cell applications with the testing of only one load cell.
6. The NCWM has signed on with the OIML-CS as a utilizing country for the acceptance of R 60 test data. (Note, it is possible to sign this agreement and still have additional requirements above and beyond those of R 60, and while there are to national differences identified and documented in the OIML-CS requirements, the need to test two load cells to obtain certification for multiple load cell applications is not one of them.

Can anyone explain why NTEP adopted this approach?

Would a weighing/load receiving element with four load cell installed, and all four load cells were marked with the "S", be acceptable?

I first thought that it may have something to with the fact that the USA has a unique load cell accuracy class, Class III L, however, I could not find any mention where the load cell selection process is different for this or other classes of accuracy.

Recommendation:

Assuming I am on the right track, I propose the following change to the NTEP load cell selection process.

C. Load Cells to be Submitted for Test

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3. General guidelines to determine the number and the capacity of cell to be tested are given below.
 - b. One cell at one capacity will usually be tested ~~for single cell to certify the cell for use in single and multiple cell~~ applications unless the request is for both 4-wire and 6-wire analog strain gage load cells. In this case, both designs must be submitted for evaluation. ~~For multiple cell applications, two load cells at the same capacity will be tested.~~ If both 4-wire and 6-wire designs are requested, then one cell must be submitted as a 4-wire design, and the other submitted as a 6-wire design.

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Discussion/Conclusion:

The sector members agreed in principle with the recommendation but felt that additional research was needed to make sure we fully understand the results of the testing of the second load cell when issuing multiple application only certification.

Darrell Flocken agreed to look deeper into the requirements with the help of Kevin Chestnut wood and bring the results and any support or changes to the current recommendation.

9. Belt-Conveyor Scale Discussion

Source:

NTEP Administrator

Background:

A manufacturer has been working with a field evaluator to do some preliminary testing of a belt-conveyor scale with the idea of applying for NTEP certification. This item is a placeholder for any discussion that may be helpful.

Discussion/Conclusion:

A brief discussion between the evaluator and other interested parties occurred. No action item was defined.

10. S.1.8.5. Recorded Representation, Point-of-Sale Systems

Source:

Loren Minnich, KS

Background:

This item was a decision item at the 2021 Weighing Sector Meeting and based on some questions raised during the discussion the submitter decided to work with the individuals' making comments. After some additional discussions, the item was returned for discussion during the 2021 meeting. It is the intention of the submitter to have the Weighing Sector support the item and submit a Form 15 for the item to be added to the 2023 S&T Committee agenda.

Recommendation:

S.1.8.5. Recorded Representations, Point-of-Sale Systems. – The sales information recorded by cash registers when interfaced with a weighing element shall contain the following information for items weighed at the checkout stand:

- (a) the net weight;
- (b) the unit price;
- (c) the total price;
- (d) the product class or, in a system equipped with price look-up capability, the product name or code number and;
- (e) the tare weight.

[Non-retroactive as of January 1, 2025]

Weight values shall be identified as tare, and net, or gross if applicable. The unit of weight shall be identified **as with the appropriate unit of measure, e.g., kilograms, kg, grams, g, ounces, oz, pounds, ~~or~~ lb, etc.**

For devices interfaced with scales indicating in metric units, the unit price may be expressed in price per 100 grams.

(Amended 1995, 2005, 2021, **and 20XX**)

Discussion/Conclusion:

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Loren Minnich, as the submitter, introduced the item and provided an explanation on why the proposal was developed. Loren received several comments from sector members and took each under consideration.

Since this was a review of an item on the NCWM S&T Committee report, no action is required by the sector.

11. Add “direct sale” to UR.3.9. Use of manual Weight Entries

Source:

NTEP Administrator / Loren Minnich, KS

Background:

At the 2021 Weighing Sector Meeting the membership agreed to submit a Form 15 to the 2023 S&T Committee Agenda that would enhance *S.1.12. Manual Weight Entries* of the Scales Code in Handbook 44. After the meeting, some additional discussion resulted in the need to better align the Specification requirement with the accompanying User Requirement (*UR.3.9. Use of Manual Weight Entries*) to add wording identifying that the stated requirements pertain only to applications when the device is used in direct sales.

To support this clarification, a Form 15 was created.

The action is for the Weighing Sector Members to support the Form 15 being submitted for inclusion into the 2023 S&T Committees Agenda.

Recommendation:

See Form 15 titled: *UR.3.9. Use of Manual Weight Entries Direct Sales Form 15 v1.pdf*

Discussion/Conclusion:

Loren Minnich, as the submitter, introduced the item and provided an explanation on why the proposal was developed. Several supporting comments were made by the sector members.

Since this was a review of an item on the NCWM S&T Committee report, no action is required by the sector.

12. Update to References Associated with the Definition of “Direct Sales”.

Source:

NTEP Administrator / Loren Minnich, KS

Background:

By adding the term “direct sale” to *UR.3.9. Use of Manual Weight Entries* it was necessary to update the references included with the term “Direct Sale” in Handbook 44, Appendix D, Definitions.

See Form 15 titled: *Appendix D Definitions Direct Sale Form 15 v1.pdf*

Discussion/Conclusion:

Loren Minnich, as the submitter, introduced the item and provided an explanation on why the proposal was developed. No comments were made by the sector members.

Since this was a review of an item on the NCWM S&T Committee report, no action is required by the sector.

13. Change in Meeting Documentation Development Process

Source:

NTEP Administrator

Background:

The responsibility for the development of the meeting agenda and summary documents has changed. Beginning with the 2021 meeting a member of the Weighing Sector, with the help of NTEP personnel, will assume this responsibility. This change is based on direction from the NTEP Committee and the NCWM Board of Directors and aligns the responsibility with the current action of other Sectors, Work Groups, and Task Groups.

During the transition period from now until the 2021 meeting, the NTEP Administrator will create the meeting agenda and complete a meeting summary report for distribution to the Sector Members, at a later date.

In addition to the assignment of the individual or individuals responsible for these documents, I would encourage the Sector to develop a timeline document to assist the individual in the ability to develop a meeting agenda in a timely manner and with the least impact to their current responsibilities. Due to meeting time constraints, I would offer my assistance to develop this timeline document offline, with the distribution, review, and acceptance of the document to occur within six months from the adjournment of this meeting. A few items to be addressed in this timeline document would be:

1. A deadline for the submittal of new proposals, and reports from subgroups with specific assigned tasks,
2. A deadline for the distribution of the agenda and summary documents.

I would suggest that the timeline document be placed on the Weighing Sector home page on the NCWM Web Site.

2020 Weighing Sector Meeting:

As reported at the 2020 NCWM Interim in Riverside, CA, NIST and the NCWM Board of Directors agreed to a change in the responsibilities for the development of the meeting agenda and the writing of the meeting summary. This change removes these tasks from the NIST Technical Advisor and moves them to the responsibility of the individual Sectors. To move forward with this change, the Sector Members are tasked with creating a position assigned to an individual who will be responsible for creating these documents. I need to point out that the NIST and NTEP Technical Advisors will support the individual in these tasks. As this may be the first you heard of this change, the NTEP Technical Advisor agreed to write the Meeting Summary for the 2020 meeting.

During the discussion, Mr. Loren Minnich (Kansas) agreed to accept this task. Ms. Tina Butcher (NIST, OWM) and Mr. Darrell Flocken (NTEP Administrator) provided comments on how this is a shared task at the National S&T Committee for the writing of their meeting summary.

Mr. Flocken mentioned that he is planning to develop a sector guideline document including possible work instructions and timelines that will be usable by all sectors.

Mr. Rob Upright (Sector Chair) thanked Mr. Minnich for agreeing to fill this position beginning with the 2021 WS meeting.

2021 Weighing Sector Meeting:

During the 2021 Weighing Sector Meeting Darrell Flocken reviewed the reason for this change and reported that he will be submitting a proposal to the NTEP Committee for a change in the NTEP Sector Structure. This change proposes adding a Vice-Chair position to the sector, whose responsibility will be to work with NTEP to develop the meeting agenda and create the meeting summary report. The proposal will also include a term limit to the chair and vice-chair position of 3 years.

Several members did voice concerns regarding the 3 year term limit for the Chair position as they felt longer terms lead to better continuity in how meetings are conducted. Darrell mentioned that he is open to any suggestion and will inform the NTEP Committee of the members concern for this limit.

2022 Weighing Sector Meeting:

During the 2022 meeting, the discussion associated with this item was the nomination and selection process needed to select a new chairperson for the sector. Darrell Flocken asked that any interested individual or

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nomination be sent to him by the end of the business day Wednesday, August 31. After which, he will create and send out a voting ballot to all Weighing Sector members. Once all votes are returned, the candidate with the most votes will be offered the position. In the event of a tie, Darrell Flocken will select the winner.

14. Next Meeting

The Weighing Sector Meeting is typically held the second or third week of August. The members are asked to provide information on the dates and location for the 2022 meeting.

Discussion/Conclusion:

The sector members present suggested that the 2023 sector meeting be held on Tuesday and Wednesday, August 22 and 23, with their second choice of Tuesday and Wednesday, August 15 and 16.

The members suggested having the 2023 meeting in locations such as Nashville, TN; Columbus, OH; or Atlanta, GA.

15. Meeting Attendees

The following individuals participated in the 2022 Weighing / Belt-Conveyer Scale Sector meeting.

Markus Born	Mettler-Toledo GmbH
Brad Bowers	Rice Lake Weighing Systems
Kevin Chesnutwood	NIST, Mass and Force Group
Scott Davidson	Mettler-Toledo, LLC
Katya Delak	NIST, Office of Weights and Measures
Jessica Ferree	Mettler Toledo
Darrell Flocken	National Conference on Weights and Measures
Alain Frenguelli	Mettler-Toledo GmbH
Jeff Gibson	Ohio Department of Agriculture
Andrew Gell	FOSS North America
Andrew Goddard	Marel Ltd
Brandi Harder	Rice Lake Weighing Systems
Jess Helmlinger	Kistler Group
Scott Henry	Zebra Technologies
Jan Konijnenburg	Stratavia
Robert Meadows	Kansas Department of Agriculture
Loren Minnich	Kansas Department of Agriculture
Eric Morabito	New York Department of Agriculture and Markets
Chaekuk Na	Rutgers Univ / C2SMART Center
John Rebant	Precia Molen, NA
Peter Sirrico	Thayer Scale / Hyer Ind., Inc.
Zacharias Tripoulas	Maryland Department of Weights and Measures
Pascal Turgeon	Measurement Canada
Eric Wechselberger	Mettler Toledo
Marc Wolff	Mettler-Toledo GmbH
Kraig Wooddell	Hobart Corporation

End of Report.....