

National Type Evaluation Program (NTEP) Belt-Conveyor Scale (BCS) Sector Meeting Agenda

February 26, 2015 / St. Louis, MO.

Introduction

The charge of the BCS 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 and 2.21. BCS Systems. The sector's recommendations are 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 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***.

Glossary of Acronyms and Terms

<u>Acronym</u>	<u>Term</u>	<u>Acronym</u>	<u>Term</u>
BCS	Belt-Conveyor Scale	NTEP	National Type Evaluation Program
MTL	Minimum Test Load	NTETC	National Type Evaluation Technical Committee
MWT	Master Weight Totalizer	OWM	Office of Weights and Measures
NCWM	National Conference on Weights and Measures	USNWG	U.S. National Work Group
NIST	National Institute of Standards and Technology		

I. Carry-over Items

A. Revision of the Belt-Conveyor Scale NTEP Checklist

1). Evaluation Checklist for Retrofit Master Weight Totalizers

Source:

USNWG on Belt-Conveyor Scales

Proposal:

Amend *NCWM Publication 14 Belt-Conveyor Scales* by incorporating recommended changes that primarily were intended to allow for the evaluation of master weight totalizers (MWT) as a component of a belt-conveyor scale system. This was intended to facilitate the certification of MWT's as replacement instruments and would not necessarily require testing on the entire belt-conveyor scale system.

Background:

Prior to the 2009 BCS Sector meeting, Mr. Bill Ripka, (Sector Chair) presented a draft of an amended *NCWM Publication 14 Belt-Conveyor Scales Technical Policy, Checklists, and Test Procedures* to the sector members for review. The proposed changes in this draft related primarily to Master Weight Totalizers intended to be installed as replacement or retrofitted instruments within an existing BCS system in addition to a number of other minor editorial changes. Among the recommended changes that were included in this draft were changes involving procedures used when evaluating semi-automatic and automatic zero-setting mechanisms.

This proposed draft has been offered to be used on a trial basis by NTEP labs when evaluating manufacturer's replacement instruments (Master Weight Totalizers) that are scheduled to undergo NTEP evaluation.

At the 2014 BCS Sector meeting, it was reported that there has not been any devices submitted for type approval that could appropriately be evaluated using the proposed amended checklist.

Following the February 2014 Sector meeting, the NTEP Belt-Conveyor Scale Sector members were contacted by the Sector Chair, Mr. Bill Ripka and were asked to participate in teleconference conducted to allow the Sector to deliberate on possible additional changes to the proposed amendments of *NCWM Publication 14 Belt-Conveyor Scales Technical Policy, Checklists, and Test Procedures*.

The primary focus of that teleconference was for the members to consider a change that would eliminate the requirement for a field permanence test as part of a type evaluation outlined in these proposed changes. Most Sector members agreed that a permanence test is necessary for the proper evaluation of an entire belt-conveyor scale system when installed however, the suggested revision of this proposal is based on the notion that a permanence test is not warranted for a MWT that is installed as an upgrade or replacement instrument for an existing system. These additional changes would not eliminate any type of testing performed under laboratory conditions however.

Following the teleconference and follow-up email exchanges among the Sector members, the Sector was asked to respond via a ballot which would indicate whether or not this revision to the original proposal was supported. The balloting of the Sector members was conducted through email and the results indicated that all active members of the Sector supported the elimination of a permanence test for replacement instruments. The Sector agreed that in addition to the removal of a required permanence testing during a type evaluation

for a MWT, several minor editorial changes were also approved. The Sector Chair agreed to forward the revised proposal to the NTEP Administrator.

Discussion:

An update on the status of these proposed changes (if available) will be shared with the Sector.

2). Review of NCWM Publication 14 List of Sealable Parameters for BCS Systems

Source:

USNWG on Belt-Conveyor Scales.

Proposal:

To review and further develop (if necessary) a list of features associated with a belt-conveyor scale system (and weigh-belt systems) that will categorize those features as either sealable or non-sealable.

Background:

The table shown below was developed during the 2009-2010 NTETC BCS Sector meetings. The table was then incorporated in the 2011 edition of Publication 14. At that time NTEP laboratories were asked to report back to the sector with comments and recommended amendments for improvement. Since then, it is not known if any manufacturers' devices have been submitted for NTEP approval to apply this list to during any evaluations.

Belt-Conveyor Scale Features and Parameters	
Typical Features to be Sealed	Typical Features and Parameters Not Required to be Sealed
Official verification zero reference Official verification span/calibration reference Linearity correction values Allowable range of zero (if adjustable) Selection of measurement units Division value, d Range of over capacity indications (if it can be set to extend beyond regulatory limits) Alarm limits for flow rate (high/low) Automatic zero-setting mechanism (on/off) Automatic zero-setting mechanism (range of a single step) Configuration (speed, capacity, calibrated test weight value if applicable, pulses per belt revolution, load cell configuration,)	Display update rate Baud rate for electronic data transfer Communications (Configuration of input, output signal to peripheral devices)
<p><i>NOTE: The above examples of adjustments, parameters, and features to be sealed are to be considered "typical" or "normal." This list may not be all inclusive, and there may be parameters other than those listed which affect the metrological performance of the device and must, therefore, be sealed. If listed parameters or other parameters which may affect the metrological function of the device are not sealed, the manufacturer must demonstrate that the parameter will not affect the metrological performance of the device (i.e., all settings comply with the most stringent requirements of Handbook 44 for the applications for which the device is to be used).</i></p>	

Discussion:

This item was included on the Sector’s meeting agenda in 2014 and the members were informed that there had been no opportunities to use the table as part of an evaluation. At this meeting, it was recommended by Mr. Ripka, (Sector Chair) that the sector members review this table to ensure that it was complete.

During the 2014 meeting, it was recommended that the function of enabling a belt-profiling function should be added as a sealable parameter in the table. No objections were heard regarding this suggested amendment. Other features were considered for inclusion on this listing during that meeting however, there was no consensus among the Sector members to make further revisions.

It has been reported to NIST OWM that devices have recently been or possibly will be submitted in the near future for type evaluation which will offer an opportunity to test the usefulness of the above table. The Sector members will be asked to revisit this issue and amend the table if necessary.

B. Linearization Feature for BCS:

Source:

USNWG on Belt-Conveyor Scales

Proposal:

Develop recommended test procedures for *NCWM Publication 14 Belt-Conveyor Scales* to evaluate the use of any linearity correction feature when used in a belt-conveyor scale system.

Background:

Many manufacturers and service agents of belt-conveyor scales have supported the use of electronic instruments equipped with a linearity correction feature (i.e. multiple point calibrations) to reduce span errors that deviate from a linear pattern. It has been reported by some Sector members that this practice may be considered as non-compliant in some jurisdictions with established weights and measures requirements.

At the 2011 BCS Sector Meeting, some members agreed to participate in a sub-committee to develop a draft of recommended test procedures that would be submitted to the NTEP Committee as proposed changes within *NCWM Publication 14*. This group was to also consider the scope for the application of any newly developed test procedures (i.e. whether the test procedures will be applied retroactively to devices that has already received NTEP approval).

This sub-committee conducted a teleconference (June 7, 2012) and agreed that any testing of a linearity correction feature could be performed either in controlled laboratory conditions or in a field installation. The group agreed that if the functioning of this feature was verified under controlled conditions during type evaluation, it should then be clearly noted on the Certificate of Conformance (CC) for the device. The sub-group also concluded that verification of this feature during field testing, could be accomplished through material tests such as those typically performed during routine official examinations.

In addition, the sub-group agreed that this feature would need to be a sealable function within the instrument. Other points regarding this issue considered by the sub-group in June 2012 included:

- The correction factor (linearization factor) must be applied at a minimum of three points or flow rates.
- It is to be determined if there is to be a limitation on the amount of correction permitted. If there is to be a limit established, the sub-group suggests that a limit of +/- 0.4% of scale capacity may be appropriate.
- The group determined that lab testing should be performed at pre-specified percentages of device capacity to ensure the feature is capable of performing correctly throughout the operating range of the device.
- The group recommended that testing be performed using predetermined correction factors. For instance:
 - flow rates equal to 25%, 50%, 75% and 90% of full scale;
 - tests for loading of +/- 0.5%, +/-1%, +/-1.5% and +/-2% of full scale at each flow rate.

Discussion:

At the 2014 BCS Sector meeting, the members discussed the advantages and disadvantages of conducting a test both in the field and in the laboratory to verify the function of a linearity correction. Sector Chair, Mr. Bill Ripka stated that to perform this test in the field would not be difficult due to the fact that practically every installation of belt-conveyor scale systems will have a certain amount of non-linear performance. This is attributed to various unaccounted influences from the installation and operational details. The test of a linearization correction could therefore be conducted in the field simply by observing the operation of the system while this feature is disabled and then again when the correction has been enabled and comparing these

results. If the system is evaluated under controlled conditions in a laboratory environment, a non-linear performance may have to be artificially induced through the use of error weights placed on or removed from the weighing elements while the system is operated.

Also discussed was an appropriate limit to be placed on the amount of correction that would be allowed by a linearization correction feature. It had been suggested by the sub-committee that a limit of +/- 0.4% of scale capacity would be an appropriate value. Some members agreed in general with this limit, however others suggested that this restriction is arbitrary and that it may be overly prescriptive to place any limitation on the amount of correction allowed to the linearity.

While considering a preliminary draft for a test procedure, the sector could not agree on certain points including what tolerance should be applied to the output of a system when linearization is being corrected through the use of this feature.

It was agreed at the 2014 meeting that this item needs to be further developed. The original sub-group formed to develop this item agreed to continue work on this item and to produce a draft test procedure that would be circulated for review by the Sector.

Since this draft test procedure was not finalized and distributed to the members as planned, the Sector will need to consider what additional steps are to be taken to resolve this issue.

C. Conveyor Belt Profiling:

Source:

USNWG on Belt-Conveyor Scales

Proposal:

Develop recommended test procedures for *NCWM Publication 14 Belt-Conveyor Scales* to evaluate the use of a belt profiling feature to provide a zero-load reference when used in a belt-conveyor scale system.

Background:

This means of establishing a zero-condition prior to a totalization operation involves the ability of the weighing device to establish “tare” weight values associated with distinct individual segments of the belt and synchronizing the application of those values to the movement of the belt segments over the scale portion of the conveyor. A majority of sector members have agreed that this feature should receive some level of evaluation, and that at a minimum, the ability to enable or disable any belt profiling feature should be protected by some form of security seal.

In addition, NIST OWM has received inquiries seeking guidance on whether this type of feature is permitted under U.S. standards. It is also being reported by some members of the USNWG BCS that some regulatory field officials will not issue an approval for devices equipped with this feature when it is not listed as a standard feature or an option on the NTEP Certificate of Conformance.

Members at the 2011 BCS Sector meeting also concluded that it may be preferable to have the analysis and necessary action(s) for the consideration of belt profiling features taken on by the same work group formed under the previous agenda item (item B. Linearization Feature for BCS).

Discussion:

During the 2014 meeting, the BCS Sector was informed that the same sub-group which was assigned to develop procedures for verifying the operation of a linearization correction had also been assigned to develop a procedure for testing the function of belt profiling. No draft procedures have been developed at the time of the 2014 BCS Sector meeting.

Similar to the previous item (linearization correction), the sector members acknowledged that this feature could readily be tested in the field and would most likely be more costly to test in a laboratory setting. All of the sector members agreed that this feature must be one protected by a type of security seal.

At the 2014 BCS Sector meeting, the sub-group asked to develop test procedures for the evaluation of this type of feature was assigned to continue work on this and to have a draft available to be presented to the sector at its next meeting for review. Since this draft test procedure was not finalized and distributed to the members as planned, the Sector will need to consider what additional steps are to be taken to resolve this issue.

II. New Items

A. Proposed changes to *NCWM Publication 14 - Belt-Conveyor Scales*

The following amendments are being proposed for the 2015 edition of *NCWM Publication 14 Belt-Conveyor Scales* to reflect changes adopted in 2014 to the *NIST Handbook 44 Section 2.21. Belt-Conveyor Scale Systems Code*.

1). *NCWM Publication 14 Section 9.7.9.*

This proposed change would eliminate altogether this checklist item and would align *NCWM Publication 14* with the most current edition of *NIST Handbook 44*.

A change to *NIST Handbook 44, Belt-Conveyor Scale Systems Code*, paragraph was adopted in 2014 as follows:

UR.1.2. Conveyor Installation. – The design and installation of the conveyor leading to and from the belt-conveyor scale is critical with respect to scale performance. The conveyor can be horizontal or inclined, but if inclined, the angle shall be such that slippage of material along the belt does not occur. Installation shall be in accordance with the scale manufacturer’s instructions and the following:

...

~~(h) Conveyor Length. The conveyor shall be no longer than 300 m (1000 ft) nor shorter than 12 m (40 ft) from head to tail pulley.~~

~~[Nonretroactive as of January 1, 1986]~~

This adopted change eliminated prescribed limits on the minimum and maximum lengths for conveyors used in belt-conveyor scale systems.

To align the content of *NCWM Publication 14 Belt-Conveyor Scales* with the current *NIST Handbook 44* the following change is recommended.

9.7.8. There shall be no tripper or movable head pulleys in the conveyor.

~~9.7.9. The conveyor shall be no longer than 1000 ft (300 m) or shorter than 40 ft (12 m) from head to tail pulley. [Nonretroactive as of January 1, 1986]~~

9.7.109. Conveyor stringers at the scale and for not less than 20 ft (6 m) before and beyond the scale shall be continuous or securely joined and of sufficient size and so supported to eliminate relative deflection between the scale and adjacent idlers when under load.

... *Subsequent paragraphs to be renumbered as needed.*

2). NCWM Publication 14 Section 9.7.1.

This proposed change would align *NCWM Publication 14* with a change adopted in *NIST Handbook 44* in 2014. This change removed prescriptive language from a requirement (UR.1.2.d) pertaining to the means by which a conveyor system uses to maintain tension on the conveyor belt. The change adopted in NIST Handbook 44 is shown below.

UR.1.2. Conveyor Installation. – ...

...

- (d) ~~Take-up Device. – If the belt length is such that a take-up device is required, this device shall be of the counter-weighted type for either vertical or horizontal travel. Any take-up device shall provide constant and consistent tension for the belt under all operating conditions.~~
(Amended 2014)

To reflect this change, it is recommended that Section 9.7.1. of NCWM Publication 14 Belt-Conveyor Scales be amended as shown below.

- 9.7.1. ~~If the belt length is such that a take-up device is required, this device shall be of the counter-weighted type for either vertical or horizontal travel. Any take-up device shall provide constant and consistent tension for the belt under all operating conditions.~~

9.7.1.1. Indicate the Type: **Counterweighted:** Vertical Horizontal

Other:

B. NTEP Belt-Conveyor Scale Sector Chair Position

The current Chair of the NTEP Belt-Conveyor Scale Sector, Mr. Bill Ripka has indicated that he will no longer be able to serve in this capacity. Mr. Ripka's resignation creates a vacancy that Sector members will need to address by electing a replacement.