Appendix A

National Type Evaluation Technical Committee (NTETC) Belt-Conveyor Scale (BCS) Sector Meeting Summary

February 23-24, 2011 / St. Louis, Missouri

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 **<u>underlining</u>** 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
BCS	Belt-Conveyor Scale	NTETC	National Type Evaluation Technical Committee
CC	Certificate of Conformance	OIML	International Organization of Legal Metrology
NCWM	National Conference on Weights and Measures	OWM	Office of Weights and Measures
NIST	National Institute of Standards and Technology	R	Recommendation
NTEP	National Type Evaluation Program	USNWG	U.S. National Work Group

Details of All Items
(In order by Reference Key)

CARRY-OVER ITEMS

1. Report from the 2011 NTEP Committee on Changes to NCWM Publication 14

Review of changes adopted in 2011 edition of *NCWM Publication 14, Weighing Devices.*

Background / Discussion:
Several changes to *NCWM Publication 14, Weighing Devices, Belt-Conveyor Scales* were recommended by the sector during the February 2010 NTETC BCS Sector Meeting and are noted in the 2010 Sector Meeting Summary. These amendments were recommended to reflect changes to the 2010 edition of *NIST Handbook 44* requirements in the BCS Scale Code (2.21.) and subsequently adopted into the following sections in *NCWM Publication 14, Weighing Devices, Belt-Conveyor Scales.*

- **Section 1, paragraph 1.8.**
  The change to this section was made to reflect the amendments to *NIST Handbook 44*, 2.21. paragraph S.1.3.1. Value of the Scale Division in 2009 and paragraph N.2.3.Minimum Test Load in 2008.

  Code Reference: S.1.2., S.1.3.1.

  1.8. The scale division shall be in increments of 1, 2, or 5 times 10k where k is an integer **and shall not be greater than 0.125 % (1/800) of the minimum totalized load.**

  1.8.1. Verify that the value of the scale division is protected by an acceptable security means (e.g., physical seal or audit trail).

- **Section 13, Field Test Procedure**
  These changes provided clarification on the minimum required number of test runs to be performed during an official test. Although exceptions for the required number of test runs are permitted for routine field testing on systems that operate at one flow rate only, the note added to the 2011 edition of *NCWM Publication 14* specifies that those sites which operate at only a single rate of flow are not appropriate for use in conducting a type evaluation.

  Field Performance Test of the Belt-Conveyor Scale

  N.2.1. Initial Verification

  A belt-conveyor scale system shall be ~~**tested at the normal use flow rate, 35% of the maximum rated capacity, and an intermediate flow rate between these two points. The system may also be tested at any other flow rate that may be used at the installation. (Added 2004)**~~ **verified with a minimum of two test runs at each of the following flow rates:**

  a. Normal use flow rate.

  b. 35 % of the maximum rated capacity. AND

  c. An intermediate flow rate between these two points.

  Note: The test site selected for permanence testing shall be capable of testing over a range of flow rates. Any site where the belt-conveyor scale system is limited to a single flow rate will not be considered acceptable.

- **Section 13, Field Test Procedure**
  These changes in *NIST Handbook 44*, 2.21 are editorial in nature and were made primarily to reflect the consolidation of the paragraphs previously numbered as N.3.1.2. Initial Stable Zero and N.3.1.3. Test of Zero Stability into one paragraph now numbered N.3.1.2. Test of Zero Stability within the 2010 edition of *NIST Handbook 44*. The consolidation was recommended to eliminate redundancy within these paragraphs and was accomplished with only minor wording changes. These changes also resulted in the paragraph previously numbered N.3.1.4. Check for Consistency of the Conveyor Belt along Its Entire Length to be renumbered as N.3.1.3.

  N.3.1.~~3~~2. Test of Zero Stability
  The conveyor system shall be run to warm up the belt and the belt scale shall be zero adjusted as required. A series of zero-load tests shall be carried out **immediately before conducting the simulated-load or materials test** until three consecutive zero-load tests each indicate an error which does not exceed ± 0.06 % of the totalized load at full scale capacity for the duration of the test. No adjustments can be made during the three consecutive zero-load test readings.

  (Added 2002) (Amended 2004 **and 2009**)

  N.3.1.~~4~~3. Check For Consistency of the Conveyor Belt Along Its Entire Length
  After a zero-load test with flow rate filtering disabled, the totalizer shall not change more than plus or minus 3.0 scale divisions (± 3 d) from its initial indication during one complete belt revolution.

  (Added 2002) (Amended 2004)

- **Section 6, Zero-Setting Mechanism**
  This change was made to reflect the addition of new paragraph S.3.1.1. in *NIST Handbook 44*, 2.21.

  Code Reference: S.3.1. <u>and S.3.1.1.</u>
  The zero-setting mechanism may be either a manual or automatic mechanism. In either case, the range of the zero-setting mechanism is limited to ± 2% of the rated capacity of the scale. If a greater adjustment is needed, the access to the adjustment must be through some security means. An audio or visual signal shall be given when the automatic and semi-automatic zero-setting mechanisms reach the limit of adjustment of the zero-setting mechanism. The zero-setting mechanism must be constructed such that the zero-setting operation is done only after a whole number of belt revolutions (a minimum of 3 revolutions or a time period equivalent to the time required to deliver 1000 d of load.) The completion of the zero-setting operation must be indicated. The low-flow lockout must be deactivated for this test.

  For systems that record the zero load reference at the beginning and end of a delivery, the range of zero-setting mechanism shall not be greater than ± 5% without breaking the security means.

  6.4. The completion of the automatic zero-setting operation must be indicated.

  <u>6.4.1. Verify that any changes in the zero reference are indicated and/or recorded.</u>

Conclusion:
Mr. Truex, NTEP Administrator, reviewed these amendments to update sector members on changes to *NCWM Publication 14*. No further discussion took place.

2. Update to NCWM Publication 14 Belt-Conveyor Scale Checklist

Status report on draft proposal for amending *NCWM Publication 14 BCS Checklist*.

Background / Discussion:
Prior to the February 2009 sector meeting, Mr. Ripka, Chair, provided a draft *NCWM Publication 14 BCS Checklist* with technical policies on the substitution of Master Weight Totalizers along with other minor editorial suggestions for review. Among the suggested changes that were included in this draft were proposed amendments to the procedures involving testing semi-automatic and automatic zero-setting mechanisms. The sector members suggested that it be used on a trial basis by NTEP laboratories when evaluating manufacturer's replacement instruments scheduled to undergo NTEP evaluation. This trial-use would serve to evaluate the checklist and to identify any gaps or necessary changes. During the meeting Mr. Ripka, Thermo-Fisher Scientific, stated that his company would possibly have an instrument that could be submitted in the near future for NTEP evaluation, allowing this checklist to be used on a trial basis.

At the February 2010 sector meeting the members were informed that there had been no instruments submitted to date for NTEP evaluation that would serve to demonstrate the usefulness of the checklist. Mr. Marmsater, Merrick Industries, Inc., indicated that his company is also expecting to have a device ready to submit for type evaluation soon. The possible use of the checklist during an evaluation on this instrument would be discussed at the 2011 sector meeting.

Conclusion:
At the 2011 NTETC BCS Sector Meeting the members were informed that to this point, there still have not been any applications submitted that would allow the use of the checklist. Mr. Marmsater, Merrick Industries, Inc., indicated that his company still expects to have an instrument ready to submit in the near future for type evaluation. No additional comments or actions were discussed at this time.

3. Develop a List of Sealable Parameters for BCS Systems

Status report on the adoption of list of sealable parameters to be included for use in NTEP evaluations of belt-conveyor scales.

Background / Discussion:
A list of device features and parameters which were identified by the sector as items that should be protected by some form of security seal was developed during the 2009 NTETC BCS Sector Meeting. This list was to be forwarded to NTEP laboratories for use on a trial basis. Comments and recommended amendments from the NTEP evaluators would then be forwarded to the sector work group for further development. The listing could then be amended if needed and a recommendation be made to the NTEP Committee for its adoption into *NCWM Publication 14*.

Conclusion:
The implementation of this list of sealable parameters is subject to the review by NTEP evaluators, as listed under the previous agenda (update of the amended NTEP evaluation checklist). Since no manufacturer's instruments have been made available at this time for the trial use of the proposed checklist or the list of sealable parameters, no further actions or discussion were justified at this time. The sector was informed that a trial application and review of both items will be performed when the opportunity arises.

NEW BUSINESS

Note: Discussion of the following item may be related to a similar agenda item addressed during the February 23-24 2011 meeting of the U.S. National Work Group (USNWG) for BCS that preceded the NTETC BCS Sector Meeting. Additional background information may be found in the USNWG 2011 Meeting Summary.

4. Linearization Feature for BCS

Draft new test procedures for the evaluation of linearization correction features.

Background / Discussion:
Manufacturers and service agents of BCS have voiced support for 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. This contrasts with reported prohibition of this type feature by certain weights and measures regulatory authorities. Some sector members have asked for clarification from the National Institute of Standards and Technology (NIST), Office of Weights and Measures (OWM) on the use of this type of feature and whether it is (or should be) permitted within current U.S. standards.

The NIST Technical Advisor informed the sector during the February 2011 NTETC BCS Sector Meeting that there is no basis for excluding the use of a linearity correction within *NIST Handbook 44* that would serve as justification to prohibit its use. In addition there are numerous NTEP Certificates of Conformance (CC) for weighing devices that include this type of feature under the listing of standard features and options for that device. The sector members were asked if they favored the development of testing procedures to evaluate linearization correction features for inclusion in *NCWM Publication 14*. Sector members were also asked whether or not the ability to enable/disable the feature should be a sealable parameter. Initial discussion among the sector revealed the majority favored the development of test procedures to assist evaluators in the examination of BCS equipped with linearization correction features.

Sector member Mr. Burrell, Control Systems Technology Pty, Ltd., raised concerns however regarding the nature of any test procedures that would be published, thus revealing proprietary information about a specific feature included in the device's programming. Other sector members raised the question of whether or not it would be sufficient to

simply require that the ability to enable or disable any linearization feature to be a sealable parameter and that the manufacturer would need to work closely with the NTEP laboratories and evaluators to ensure that this type of feature would be examined properly. Mr. Barton, NIST Technical Advisor added that it would seem appropriate to develop testing procedures that would, at a minimum ensure that the existence of this feature within a device would not allow the device to be used in a fraudulent manner.

Mr. Truex, NTEP Administrator, stated that the NTEP evaluator must be informed by the device manufacturer of any feature that has metrological significance so that feature may be evaluated. Mr. Truex added that he believes this type of feature should be tested in a laboratory environment and probably not in a field environment.

The possibility of developing test procedures of a generic nature so as to avoid revealing sensitive technical, proprietary details about any particular instrument was discussed among the sector. Those members who represent manufacturers at the meeting agreed that draft test procedures could be developed. They stated that the procedures could be drafted to be sufficient enough to provide an evaluator with instructions on thoroughly testing a device, but not extensive enough to expose sensitive information about the device if these test procedures are published.

Another point raised by Mr. Burrell, Control Systems Technology Pty, Ltd., was whether or not devices that are currently covered under an active CC that includes linearization correction features would need to be revaluated if and when testing procedures relative to a linearization feature are developed and published in *NCWM Publication 14*. Other manufacturers within the group expressed their belief that it would be necessary for devices equipped with this feature to undergo at least a partial revaluation if and when the test procedures were adopted into *NCWM Publication 14*.

Conclusion:
Manufacturers attending the NTETC BCS Sector Meeting agreed to participate in a sub-group formed to develop a draft of test procedures for recommendation to the NTEP Committee. This sub-group will 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 have already received NTEP approval). The sub-group includes the following members:

- Mr. Bill Ripka, Thermo Fisher Scientific
- Mr. Peter Sirrico, Thayer Scale / Hyer Industries
- Mr. Lars Marmsater, Merrick Industries, Inc.
- Mr. Ian Burrell, Control Systems Technology Pty, Ltd.

The sub-group will continue work on developing test procedures through correspondence and will offer the first draft for review by the entire USNWG by April 30, 2011.

5. Conveyor Belt Profiling

Draft new *NCWM Publication 14* procedures for evaluation of belt profiling (belt mapping) feature.

Note: Discussion of the following item may be related to a similar agenda item addressed during the February 23-24 NTETC BCS Sector Meeting of the USNWG for BCS that preceded the NTETC BCS Sector meeting. Additional background information may be found in the USNWG 2011 Meeting Summary.

Background / Discussion:
This method of establishing a zero-condition for a totalization operation enables the belt-conveyor scale to synchronize the application of an individual tare weight values associated with distinct segments of the belt to the movement of those belt segments over the scale portion of the conveyor. If this alternative to averaging the weight of segments of the belt carcass is used there may be a need to establish a procedure to evaluate its effectiveness, to ensure that it functions as intended, and is maintained during operation of the BCS.

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 on 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 option on the NTEP CC.

Current *NIST Handbook 44* and International Organization of Legal Metrology (OIML) Recommendation (R) 50 [Continuous totalizing automatic weighing instruments (belt weighers)] requirements were developed for systems that average the weight of belt segments by continuously weighing the belt as it passes over the scale portion of the conveyor. The draft revision of OIML R 50 however, does include terminology that explicitly recognizes the belt profiling feature as a means of establishing and maintaining a zero condition. The current draft of R 50 also addresses the need to verify the performance of the synchronization of belt segment weights with the travel of belt segments over the weighing device.

At the February 2011 NTETC BCS Sector Meeting, the sector was asked to determine the need for including this feature within U.S. standards and procedures (*NIST Handbook 44* and *NCWM Publication 14*) as well.

During the February 2011 NTETC BCS Sector Meeting the members were asked to consider if there is there is a need for procedures to evaluate the effectiveness of belt profiling and to ensure that correct operation is maintained during totalization. A majority of sector members voiced their opinion that this feature should receive some level of evaluation, and that at a minimum the ability to enable or disable the belt profiling feature should be protected by some form of security seal.

Mr. Chase, Chase Technologies, Inc., stated that profiling should not be viewed as an independent function but that it is more appropriately classified as a subset of Automatic Zero Tracking. Automatic Zero Tracking features are already required to be protected through a type of security seal.

Mr. Barton, NIST Technical Advisor, asked the sector members if the need exists to develop type evaluation test procedures to verify that the function of the belt profiling feature will be effective throughout a range of changing conditions that the belt-conveyor scale system may be subject to. The members generally acknowledged that its performance could be a concern and that changes in environmental conditions affecting characteristics of the belt (i.e., elasticity, length) must be compensated for.

Mr. Ripka, Chair stated that clarification is needed to provide direction for the use of the proposed *NIST Handbook 44* requirement pertaining to conveyor belt consistency (N.3.1.3) in association with the belt profiling feature. The proposed draft of N.3.1.3. will require that the condition of the conveyor belt be maintained so that excessive deviation from an established zero condition is controlled. Mr. Ripka asked the sector members for their position on whether the requirement pertaining to belt consistency would be applied to the system before or after a belt profiling feature is placed in operation. While there were no definitive responses, it was acknowledged that the use of both types of zero maintenance controls may be redundant and further consideration is needed.

Conclusion:
While there was no consensus reached within the sector on whether test procedures are needed to evaluate this feature while the device is under type evaluation, it was agreed that belt profiling is a metrologically significant feature. In addition, the sector members felt that at a minimum, the activation of this feature should be required to be protected by a form of security seal.

Mr. Barton, NIST Technical Advisor suggested that the belt profiling is a matter that is best understood and applied by belt-conveyor scale manufacturers. For that reason, it may be preferable to have the analysis and necessary action(s) for the consideration of belt profiling features taken on by the same sub-group formed under the previous agenda item. That sub-group's members agreed to work outside of the time constraints of the sector meeting to develop a draft for test procedures deemed necessary to evaluate a belt profiling feature in use with a device submitted for type evaluation. The sub-group includes the following members:

- Mr. Bill Ripka, Thermo Fisher Scientific
- Mr. Peter Sirrico, Thayer Scale / Hyer Industries
- Mr. Lars Marmsater, Merrick Industries, Inc.
- Mr. Ian Burrell, Control Systems Technology Pty, Ltd.

A draft of test procedures developed by the sub-group is expected to be made available for review by the entire membership of the sector by April 30, 2011.

6. Provision for Sealing

Should *NCWM Publication 14 BCS Checklist and Test Procedures*, Section 1.1 include *NIST Handbook 44*, G-S.8 as a code reference for sealing a device?

Background / Discussion:
The first paragraph of *NIST Handbook 44* General Code requirement G-S.8. Provision for Sealing Electronic Adjustable Components is nearly identical to that of *NIST Handbook 44* BCS Code paragraph S.5. Provisions for Sealing.

Paragraph S.5 differs however, in that it does not include references for automatic or semi-automatic calibrations mechanisms whereas G-S.8 includes a second paragraph in the requirement addressing automatic or semi-automatic calibrations. Since automatic or semi-automatic calibrations mechanisms are incorporated into belt-conveyor scale systems the sector should address this inconsistency.

The work group had no initial comments regarding this item. Mr. Barton, NIST Technical Advisor suggested that a draft amendment for *NIST Handbook 44* Belt-Conveyor Scale Code, paragraph S.5, be developed and then circulated among the members of the USNWG on BCS by way of email. The work group members can then review the draft and respond with comments electronically. If the recommendation is favored, the need to protect access to an automatic/semi-automatic calibration feature will need to be included as part of type evaluation procedures in *NCWM Publication 14*. The sector members agreed to review the draft recommendation and provide any comments on it.

Conclusion:
Mr. Barton, NIST Technical Advisor, will draft language for the inclusion of a second paragraph amending *NIST Handbook 44*, 2.21 paragraph S.5 to recognize the need to protect access to automatic/semi-automatic calibration feature by way of a security seal. This draft will be circulated among members of the USNWG on BCS and the NTETC BCS Sector for their review. The draft will be circulated by April 30, 2011. A final draft will be developed based on comments received and submitted for approval by the Specifications and Tolerances Committee.

7. Clarification of Guidelines Used for the Selection of Instruments for Type Evaluation

Parameters used for classification of devices as part of a type or "family" of manufacturer's model design.

Background / Discussion:
During the February 2010 NTETC BCS Sector Meeting the sector members acknowledged that the existing language in *NCWM Publication 14* BCS Sections A through G is vague and that it would be useful for criteria used in the selection of instruments to undergo evaluation as representative of a certain type or family to be further defined.

The existing language categorizes devices by the number of weigh idlers used for the weighing portion of the belt-conveyor and, a 10:1 ratio based on the size, loading and speed of the belt/weighbridge.

Mr. Barton, NIST Technical Advisor, offered some examples of additional requirements for a suitable representative device:

- One that includes all possible interfaces (communication ports, remote calibration, etc.);
- Similar or the same type of load cell or load receptors (should there be a limited capacity range for substitution load cells or for load cells listed on the CC?);
- Single speed or variable speed operation;
- Method of zero calibration and maintenance; and
- Other metrological features such as those found listed in the sector's proposed table of "Belt-Conveyor Scale Features and Parameters" (See 1.b. above) such as:
  - Selection of measurement units;
  - Division value, d; and
  - Range of over capacity indications.

Mr. Burrell, Control Systems Technology Pty, Ltd., questioned the usefulness of categorizing instruments in families and supported this view by stating that most if not all devices that are sold by his company are designed and constructed specifically to suit the needs of each individual customer.

Mr. Ripka, Thermo Fisher Scientific, informed the sector that the options which are programmable through an electronic control instrument that limit the range of operation are not a significant consideration for this classification process. Mr. Ripka stated that it is the design structure of the system components rather than programmable options which will be most meaningful in providing a means to categorize BCS systems. The justification for his belief is that it is the design and construction of the structural elements of the system that will determine loading capacity and capability of a BCS.

Mr. Burrell, Control Systems Technology Pty, Ltd., also stated that it is his belief that a 10:1 ratio currently used to classify devices as types or families is simply an arbitrary figure and that there should be more latitude allowed. Mr. Truex, NTEP Administrator, stated that the 10:1 ratio was selected out of the necessity to establish a basis for criteria and that the same ratio is used for many other type of devices.

Mr. Barton, NIST Technical Advisor, suggested that if the design and construction is the prime consideration, then perhaps the BCS manufacturers would be the most logical sources for drafting specific criteria to be used to show commonality between devices and therefore considered as belonging to the same type or family.

Conclusion:
Burrell, Control Systems Technology Pty, Ltd., and Mr. Ripka, Thermo Fisher Scientific, agreed to work on developing additional specific criteria and that they would have a draft to offer the Sector by August 1, 2011 for review. Mr. Burrell also recommended that Mr. Chase, Chase Technologies, Inc., be included in the development of the draft. Mr. Chase agreed to participate in developing this draft.

ATTENDANCE

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