

**Multiple Dimension Measuring Devices Work Group
Meeting Summary**

October 28-29, 2014 - Reynoldsburg, Ohio

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Preliminaries

- i. **Introductions and Welcome of New Work Group Members** (*R. Kennington*)
- ii. **Reiteration of NTEP Multiple Dimension Measuring Devices (MDMD) Work Group Mission** (*J. Truex / D. Flocken*)

Discussion: Mr. Jim Truex (NTEP Administrator) and Mr. Darrell Flocken (NTEP Specialist) discussed the mission of the MDMD Work Group (WG) for the benefit of all participants. It was stated there is not much detail included in the NTEP checklist with regard to the testing of MDMDs. The MDMD WG is not considered an NTEP Sector. The mission of the WG is to deal with specific issues concerning MDMDs; i.e., to consider the requirements in NIST Handbook 44 (HB44) and make sure NTEP has a type evaluation checklist in place to verify compliance with HB44 and influence factor testing. NTEP has been asked for years to consider encompassing MDMD's under the Measurement Canada (MC)/US Mutual Recognition Arrangement (MRA). At a July 2014 NCWM meeting Mr. Gilles Vinet (MC) announced Canada wishes to consider including MDMDs under the MRA umbrella with the US. MC has requested to be lead laboratory. The NCWM Board of Directors is seeking input from MDMD WG with respect to this issue. This would be an annex to the current agreement.

- iii. **Goal of this Meeting** (*J. Truex / D. Flocken*)

Discussion: The challenge is that this group must agree on a common type evaluation checklist. Equipment manufacturers check with MC because they have the most thorough checklist. The NTEP checklist must closely resemble MCs. Getting the technical stuff to agree is the challenge. Requirements between the two countries are similar, but they will never match exactly. We can deal with this. Can we overcome the differences in the checklists? That is the challenge.

- iv. **Report – 2014 NCWM Annual Meeting** (*J. Truex*)

Discussion/Update: The NCWM Annual Meeting was well attended and went well, although there was some controversy concerning alternative fuels. There were no MDMD issues on the agenda. One Specifications and Tolerances (S&T) Committee agenda item involves a company from New Zealand (LoadScan, Ltd.) that manufactures a device, which can measure product in the bed of a truck or trailer. The company is seeking to include new requirements in HB44 that would address this device.

- v. **Report – Activity of Measurement Canada** (*Pascal Turgeon and Isabelle Tremblay (MC)*)

Note: This agenda item and Carryover Item 4. were combined into a single agenda item.

Discussion/Update: The discussion of the combined items was led by Mr. Pascal Turgeon (MC) with additional input provided by Ms. Isabelle Tremblay (MC). Mr. Turgeon distributed three handouts to the WG as follows:

1. A handout of definitions that apply to terms and conditions titled "INTERPRETATION (Oct 2014). A copy of this document can be found in Appendix A of this report.
2. A spreadsheet showing MC and NTEP checklist references in a side by side format with requirement descriptions. It was stated that this document was last updated in 2012. A copy of this document can be found in Appendix B of this report.
3. A handout titled "Comparison of MDMD Specifications to OIML R129 and USA HB 44 Code 5.58 (Jan 16, 2012)."

MC's project manager announced in July that MC would like to move forward with the MRA to include MDMDs. The goal is to achieve MRA, i.e., come to agreement on various requirements. OIML R-129 was last revised in 2000. If the WG agrees to something at this meeting that deviates from R-129, it may need to propose changes to R-129 when that document is opened again for revision.

MC is seeing more and more MDMDs being installed in the field and as a result it is receiving more requests for test boxes. A common problem is the weight of the boxes. Max weight of a test box should be 22 pounds. New material will be used in the construction of test boxes (Mr. Turgeon passed around a sample of the new material for WG members to see). Different shapes for test objects are also being considered by MC. These will be "known" shapes.

MC may also be adding some new tests. Temperature tests are problematic with regard to full size versus smaller size devices. Some boxes are being wrapped with a black film, which requires different lasers to measure accurately. MC is considering tests for verifying accuracy when shrink wrap is used. If there are differences in MC and US tests, this would not preclude a manufacturer from seeking a certificate from one of the two countries, e.g., the U.S., and not the other. With respect to freight overhanging a pallet, palletized freight is not addressed in HB44 or OIML R-129.

vi. Report – Recent NTEP MDMD Type Evaluation Activity (J. Truex)

Discussion/Update: It was reported that the Ohio NTEP laboratory has had nine assignments in 2014, three of which were new manufacturers (or applicants) that had never previously submitted equipment to the Ohio lab. MC has had approximately three new devices, one of which is from a new applicant, i.e., a manufacturer MC had never worked with prior to 2014.

CARRYOVER ITEMS

1. Review MDMD meeting minutes from 2010 meeting

Discussion: It was stated that there were two follow-up items from the 2010 meeting as follows:

- (1) Develop a comparison of US and MC type evaluation criteria.
- (2) One discussion topic at the meeting was the test objects used by MC.

With regard to the first item, a comparison spreadsheet was completed by Mr. Justin Rae (MC), which is the second document that was handed out by Mr. Pascal Turgeon in Agenda Item v.; a copy of which can be found in Appendix B of this report. With regard to the second item, Mr. Scott Davidson (Mettler-Toledo, Inc.) had distributed a copy of the test objects specifications. A copy of this document is included in Appendix C of this report.

Mr. Robert Kennington (Quantronix, Inc.), Chairman of the MDMD WG led a review of the 2010 meeting agenda. Items still of importance included on that agenda were identified as follows:

- a. The standards used to test irregular objects - Mr. Joe Morrison (Ohio) pointed out that the Ohio lab uses an "L" shaped object to conduct such tests. MC uses several different shaped objects – refer to Appendix C of the 2014 MDMD meeting agenda to view illustrations of the different shaped objects used by MC.
- b. The rotation of an object into the smallest cuboidal box. Mr. Scott Wigginton (UPS) commented that UPS views this as a very significant issue. He stated that if we can't get close enough on test requirements, there's no point in having a mutual arrangement because to obtain approval, a device would still need to be submitted to the different laboratories. Mr. Darrell Flocken agreed.

- c. The measurement of palletized objects.

2. Review changes to NIST, Handbook 44, MDMD code since last meeting

Discussion/Update: It was reported that there have been two changes to the NIST Handbook 44 MDMD code since the last WG Meeting (i.e., in 2010) as follows:

1. The title “Other Devices Designed to Make Multiple Measurement Automatically to Determine Volume” was added to paragraph A.2.
2. Paragraph N.1.4.3. Test Objects with Protrusions (shown in the box below) was deleted by adoption of a 2012 proposal. That is, the paragraph did not appear in the MDMD code after 2012.

N.1.4.3. Test Objects with Protrusions. – If the device is marked with a minimum protrusion dimension to be measured, a test object with protrusion shall be used to verify the marked limitation during type evaluation.

3. Review changes to NCWM, Publication 14, MDMD Checklist

Discussion/Update: It was reported that there have been two changes to the MDMD checklist in NCWM, Publication 14 since the last WG Meeting (i.e., in 2010) as follows:

1. The title of Section 8 “Accuracy” was changed to “Performance Tests” as the result of a 2010 MDMD WG recommendation.
2. A statement was added to the “Purpose” in Section 10 Influence Factor clarifying procedures to use for influence factor testing.

4. Review changes to Measurement Canada MDMD Terms and Conditions

Discussion/Update: Mr. Pascal Turgeon (MC) reported that the handout titled “INTERPRETATION (Oct 2014),” which was distributed when discussing Agenda Item v., depicted changes to MCs MDMD terms and conditions that were going to be adopted. He noted that blue text in the document provides the rationale for the requirement and is not actually part of the document. Maroon text identifies different terms defined in the Interpretation Section of the document.

5. MDMD and the Mutual Recognition Agreement with Canada

Source: NTEP Administrator

Background /Discussion: The NCWM Board of Directors has directed NTEP to explore the possibility of expanding the scope of the NCWM/Canada Mutual Recognition Agreement (MRA) to include Multiple Dimension Measuring Devices. Measurement Canada (MC) has agreed to engage in discussions towards expanding the scope of the MRA. Key elements of this consideration are to discuss, develop, and identify 1) the impact to each country, 2) the pros/cons, and 3) a list of the difference in requirements and procedures between the two countries. Once these tasks are completed expansion of the MRA must be evaluated and agreed upon by MC and the NCWM.

Recommendation: The WG is asked to identify the different checklist requirements and test procedures, US/NTEP vs MC, for MDMDs.

Conclusion: Following the conclusion of the 2010 MDMD Work Group Meeting, Mr. Justin Rae (MC) developed a comparison summary of the requirements in Publication 14 verses those in the Measurement Canada Manual. The report was reviewed during the 2014 MDMD WG meeting to identify different checklist requirements and test procedures. This activity is ongoing as the WG is currently developing a joint US/MC type evaluation checklist.

NEW ITEMS

6. Review current position / list of action items

Source: NCWM Board of Directors / NTEP Committee

Background /Discussion: The Work Group has been charged with the task of identifying and recommending changes to the current NTEP and Measurement Canada documents in order to permit the additional of MDMD Devices to be included in the Mutual Recommendation Agreement (MRA) on Type Evaluations. This charge is to include:

1. The comparison of specifications and tolerances between Handbook 44 and the Measurement Canada Terms and Conditions and document all differences with the intent of addressing these differences in the evaluation checklist or recommend a change to the specification and/or tolerance one or both documents.
2. The comparison of the current NTEP and Measurement Canada Type Evaluation Checklist to identify differences that may be changed with the intent of harmonizing the two documents. An initial comparison has been made by Justin Rae of Measurement Canada, a copy of this comparison can be found in Appendix B of this agenda.
3. The NCWM Board of Directors and the NTEP Committee, at the suggestion of Measurement Canada, is asking the Work Group to consider recommending the Measurement Canada Evaluation Checklist be the primary document for the evaluation of MDMD Devices.
4. The NCWM Board of Directors and the NTEP Committee, at the suggestion of Measurement Canada, is also asking the Work Group to consider recommending that the Measurement Canada Evaluation Laboratory be identified as the primary laboratory for the evaluation of MDMD Devices.

Conclusion/Discussion: With respect to Charges 1 and 2 of this item, the MDMD WG reviewed the comparison summary list of US and MC requirements developed by MC and identified a number of differences in the type evaluation checklist criteria of the two countries. The WG agreed that changes would be needed to both the Publication 14 MDMD checklist and the MDMD Code of NIST HB44 in order to better harmonize US/MC requirements. The WG developed a list of changes that would be needed and it is anticipated that this list will be used by the WG to develop future proposals to amend both NIST Handbook 44 and NCWM Publication 14.

With respect to Charge 3 of this item, the WG agreed to recommend that MC not be the primary document for the evaluation of MDMDs and that each country adopt its own checklist. The WG is currently developing a joint US/MC type evaluation checklist and intends to propose in the future, changes to both NIST Handbook 44 and the MDMD portion of NCWM Publication 14.

With respect to Charge 4 of this item, there was no consensus of the WG on this issue because: 1) it was reported that test data would not be mutually accepted if Canada were to be the primary laboratory; and 2) the time it takes for manufacturers to obtain a certificate through the MC lab due to a backlog of evaluations and custom issues. During the discussion of this charge, it was stated that the MRA is simply an acceptance of test data. Under the arrangement being considered, if MC is made primary lab, it would not accept US type evaluation data but the U.S. would accept MC's type evaluation data. MC would perform tests that are included in the U.S. type evaluation checklist even though some of the tests might be exclusive to the U.S. and not a part of MC's evaluation of a device.

7. Review meeting activities and conclusions

Discussion: The WG identified a total of six items that will require proposals to amend NIST Handbook 44. (*Technical Advisor's note:* A seventh item possibly requiring a proposal to amend HB44 is the gap in US requirements needed to

address multi-interval MDMD's. A small subgroup was formed to develop requirements that address multi-interval MDMD's for HB-44 and Pub 14 MDMD. Members of the subgroup are as follows: Mr. Darrell Flocken, Mr. Rick Harshman, Mr. Scott Davidson, Mr. Justin Rae, and Mr. Scott Wigginton.

Ms. Isabelle Tremblay (MC) agreed to e-mail MC's current MDMD type evaluation checklist to Mr. Flocken and Mr. Harshman – i.e. the portions of the checklist that are considered fully developed.

8. Define next steps

Conclusion: The following next steps were identified:

- Mr. Rick Harshman is to distribute meeting notes to members of the WG at his earliest convenience.
- Mr. Harshman is to prepare a Draft MDMD WG Meeting Report and submit it to Mr. Robert Kennington, WG Chairman, for final approval. Once accepted, the report in final form will be forwarded to Mr. Jim Truex not later than December 12, 2014; that is, in time for submission to the NCWM.
- The WG agreed that recommendations to amend NCWM Publication 14 could not possibly be completed in time to submit them to the NTEP Committee for consideration in the current NCWM cycle. Consequently, it was decided that Mr. Truex will report to the Committee that a joint MC/US type evaluation checklist is being developed by the MDMD WG. Proposals to amend NCWM Publication 14 and NIST Handbook 44 most likely could be made ready for submission in time to be considered in the 2016 NCWM cycle.
- Mr. Darrell Flocken volunteered to develop a new comparison document (or spreadsheet) that shows comparable US/MC paragraph references and provides indication of the WG's decisions to recommend amending NIST Handbook 44 and NCWM Publication 14. There were a few incorrect paragraph references in the comparison document developed by MC. Mr. Pascal Turgeon agreed to complete the necessary corrections and make Mr. Flocken aware of the changes so that he could include them in the new document that he will be creating. Mr. Flocken hopes to have the comparison document completed and distributed to members of the WG for their review in the March/April 2014 timeframe.

9. Next meeting

The WG tentatively agreed to meet again in May of 2015; that is, shortly after distribution of the new comparison document being prepared by Mr. Darrell Flocken. It was decided that the meeting location would, once again, be Columbus, OH.

Appendix A: Meeting Handout of MC Definitions that Apply to Terms and Conditions

NIST Technical Advisor's Note: Shaded portions of the following document are comments that provide the rationale for the requirement and are not part of the actual document. Terms that are italicized in the document are defined in the Interpretation section (i.e., Section 1 of the document).

INTERPRETATION (Oct 2014)

1 The following definitions apply in these terms and conditions.

"multiple-dimension measuring device" means a measuring machine that measures the *dimensions* of an object and determines the *hexahedronal dimensions* of that object. (*appareil de mesure multidimensionnelle*)

"dimensions" means length, width and height, measured in units of length. (*dimensions*)

"hexahedron" means a geometric solid or box consisting of six rectangular planes. (*hexaèdre*)

"hexahedronal dimensions" in respect of an object, means the *dimensions* of the smallest *hexahedron* within which an object can be contained. (*dimensions hexaédriques*)

"hexahedronal volume" in respect of an object, means the volume of the smallest *hexahedron* within which an object can be contained. (*volume hexaédriques*)
this term is intended to emphasize to a reader that the declared volume is that of the smallest hexahedron and not necessarily that of the object.

"interval" or "d" means the difference between two consecutively indicated values on an axis of a *multiple-dimension measuring device*. (*échelon ou d*)

"multiple-interval measuring range" means a measuring range consisting of two or more partial measuring ranges, each with a different *interval*. (*étendue de mesure à échelons multiples*)

"indicator" means that part of a *multiple-dimension measuring device* that displays measurements and information related to the measurement process. (*indicateur*)

"measuring element" means that part of a *multiple-dimension measuring device* that does not include the *indicator*. (*élément mesureur*)

"registration" means a displayed, printed or recorded representation of any measurement or other information required under these Specifications. (*enregistrement*)

"ready condition", in respect of a *multiple-dimension measuring device*, means the condition of its being ready to make a measurement. (*état prêt*)

"zero reference", in respect of a *multiple-dimension measuring device*, means the point from which a measurement is made. (*référence à zéro*)

"dimensional weight" means a numerical value calculated by applying a conversion factor to the *hexahedronal dimensions* or *hexahedronal volume* of an object for the purpose of determining postage, freight or storage charges. (*poids dimensionnel*)

"tare" means a value that is used to reduce the *dimensions* of an object. (*tare*)

"tare function", in respect of a *multiple-dimension measuring device*, means a process, mechanism or feature that allows it to utilize *tare*. (*fonction tare*)

"influence factor" means an identified phenomenon or event to which a *multiple-dimension measuring device* is exposed and whose characteristics fall within the operating parameters of the device. (*facteur d'influence*)

"disturbance" means an identified phenomenon or event to which a *multiple-dimension measuring device* is exposed and whose characteristics fall outside the operating parameters of the device. (*perturbation*)

APPLICATION

- 2 These terms and conditions apply to *multiple-dimension measuring devices* that provide *hexahedronal dimensions* for use in the calculation of freight, storage or postal charges.

DESIGN, COMPOSITION AND CONSTRUCTION

- 3 A *multiple-dimension measuring device* must be of a design, composition and construction that under normal conditions of use enable the device to measure accurately and do not facilitate the perpetration of fraud.
-this section is intended to ensure that devices are designed and constructed in such a way that they are able to produce accurate measurements.
-it is also intended to provide a general means of dealing with problematic device features that may not be addressed elsewhere in these terms and conditions.
- 4 A *multiple-dimension measuring device* must be designed and constructed in a way that enables inspection procedures and test standards to be applied to the device.
the intent of this section is to ensure that MDMDs are physically testable and have the necessary features to facilitate proper inspection of them.
- 5 A *multiple-dimension measuring device* must be equipped with a feature to indicate the software and any version of the software that it is using.
-this section is intended to allow quick determination by inspectors, owners, manufacturers and technicians that a device is or isn't utilizing software that has been identified as problematic.
- it also facilitates corrective actions when new problems are found with an MDMD's software.
- 6 The interval of a *multiple-dimension measuring device* must be presented in a decimal format and must be
- (a) equal to 1×10^n , 2×10^n or 5×10^n , where the power "n" is a positive or negative whole number or zero; or
 - (b) a binary submultiple of a Canadian unit of measurement set out in Schedule II to the *Weights and Measures Act*.
- 7 A *multiple-dimension measuring device* that has a multiple-interval measuring range must be configured as follows:
- (a) the value of the *interval* of every measuring range must be less than the value of the *interval* of the subsequent measuring range ($d_1 < d_2 < d_3 \dots < d_r$);
 - (b) the maximum length of every measuring range must be equal to the minimum length of the

subsequent measuring range (min = min 1, max = max r, max 1 = min 2, etc.);

- (c) the minimum length of every axis must be equal to the minimum length of the lowest measuring range of the axis; and
- (d) the maximum length of every axis must be equal to the maximum length of the highest measuring range of the axis.

8 When measuring an object, a *multiple-dimension measuring device* that has a *multiple-interval measuring range* must automatically use the partial measuring range appropriate to the *dimensions* being determined.
-having the interval size selected automatically makes the user's task easier and contributes to the accurate measurement of packages.

9 A *multiple-dimension measuring device* must be equipped with the following items:

- (a) an indicator or printer that has indicating or recording elements with digits of a design, number and size that permit a clear indication of accurate measurement; and
- (b) if it is installed with two or more measuring elements connected to a single primary indicator or printer that is separated from one or more of its measuring elements by a distance that does not allow easy inspection, a portable indicator that
 - (i) is configured to provide the same information as the primary indicator or printer,
 - (ii) provides information that is in exact agreement with the information provided by the primary indicator or printer, and
 - (iii) is readily connectable to all of the measuring elements without affecting the performance of those elements.

-this is to facilitate inspections.

-it allows inspection of the MDMD at the remote measuring element using the portable indicator.

10 A *multiple-dimension measuring device* that has a means of registration that is connected to two or more *measuring elements* must be equipped with features that

- (a) automatically identify the *measuring element* that is providing the displayed information; and
- (b) prevent the activation of any *measuring element* that is not in use.

paragraph a)

-the purpose is to let interested parties know which measuring element is doing the measuring and thus observe the process for any problems.

-it is also for use in complaint investigations or follow up actions by identifying the potential source of a problem.

paragraph b)

-the purpose of paragraph b) is to allow an operator to deactivate a measuring element for any reason deemed necessary.

11 A *multiple-dimension measuring device* that is equipped with an *indicator* which consists of display

elements or segments that may fail individually and produce incorrect information must have a display test mode that shows all relevant elements and segments of the *indicator*.

- this section is aimed at indicators that consist of individual display elements or segments which can fail or burn out.
- the failure of individual segments results in an indicator that appears to be operating properly but which is producing erroneous information.
- for example, an individual element might stay on when it should be off or might be off when it should be on.
- this section is included to provide an operator or inspector with a quick way to determine if the display segments are operating correctly.
- other types of indicators, such as computer monitors, that do not fail in this way are exempt from this section.

- 12 A *multiple-dimension measuring device* must not provide a measurement registration until the operating temperature necessary for accurate measurement has been attained.
- this section is to ensure accurate measurement.
 - a specific temperature does not have to be stated by the MDMD manufacturer.
- 13 (1) A *multiple-dimension measuring device* must be equipped with a feature by which the zero reference or ready condition can be established.
- (2) The feature must be interlocked so that its use is prevented during measurement.
- subsection (1)
- the purpose is to facilitate accurate measurement.
- subsection (2)
- the purpose is to prevent inadvertent or deliberate measurement errors.
- 14 (1) A *multiple-dimension measuring device* must automatically maintain a *zero reference* or *ready condition* when no object is in or on the *measuring element* or, when a *zero reference* or a *ready condition* has not been established and maintained, must not provide any measurement *registrations*.
- (2) When a *zero reference* or *ready condition* has been established, a *multiple-dimension measuring device* must indicate that fact.
- for most applications and for most operators, it is desirable to have the zero maintained automatically.
 - however, when the zero or ready condition is lost, the MDMD must stop providing measurements.
 - the purpose of subsection (2) is to allow an operator to clearly see that the equipment is ready for use.
 - this can be done in various ways and will normally be described in the NoA.
- 15 The measurement *registrations* of a *multiple-dimension measuring device* and any equipment or accessories connected to the device or used in conjunction with it must
- (a) agree exactly;
 - (b) be clear, accurate and unambiguous; and
 - (c) when provided in printed form, be printed indelibly.
- the purpose of this section is to ensure that all forms of measurement registration provided by a device and all of the equipment used in conjunction with the device, including metrological information transferred or downloaded to a computer, meet the requirements of this section.
 - this requirement doesn't apply to information being used for non trade or internal company purposes.
 - dimensional weight is not a measurement registration.

16 The measurement *registration* of a *multiple-dimension measuring device* must

- (a) be expressed in the same unit of measurement for each of the three axes;
- (b) be expressed in a single unit of measurement; and
- (c) include the name or symbol of the unit of measurement.

the objectives of this section are simplicity and clarity.

paragraph (a)

-having each of the dimensions in the same unit is easier to read.

paragraph (b)

-prevents the use of mixed units such as cm/mm, feet/inches when quantifying a measurement.

-examples: 8.7 cm or 87 mm are acceptable whereas 8 cm, 7 mm is not.

30 inches or 2.5 feet are acceptable whereas 2 feet, 6 inches is not.

17 (1) A *multiple-dimension measuring device* that provides a measurement *registration* of the *hexahedronal volume* of an object must also provide the *hexahedronal dimensions* of the object.

(2) A *multiple-dimension measuring device* must not express the dimensional weight of an object in any unit of measurement that is set out in Schedule I or II to the *Weights and Measures Act*.

section 17 (1)

- the reason for this is that the volume is calculated, not measured, and when following up on a complaint or an enquiry, it's the measured dimensions that will be important to the investigation.

- a calculated volume can be the result of more than one set of dimensions.

For example;

20 cm x 30 cm x 15 cm = 9 000 cm³

20 cm x 25 cm x 18 cm = 9 000 cm³

section 17 (2)

- dimensional weight is a calculated value, not an actual weight and as such may not be accompanied by a unit of measurement on the MDMD indicator.

- this subsection only applies to the MDMD and not to a printed dimensional weight.

- the reason is that dimensional weight is a not a measurement registration. (see section 15)

18 A *multiple-dimension measuring device* must not provide a negative measurement *registration* except when it indicates a tare.

- the purpose of this section is to prevent any miscalculations or errors as a result of the inadvertent inclusion of a negative registration in a calculation.

- examples of what might be tared; handles on a case, strapping protrusions on a carton, the height of a pallet.

- neither this section nor any other section requires that an MDMD must have tare capabilities.

19 (1) The tare function of a *multiple-dimension measuring device* must operate only in a negative direction in relation to the *zero reference* or the *ready condition*.

(2) A *multiple-dimension measuring device* must clearly indicate when the tare function is in use.

(3) The value of the tare *interval* must be equal to the value of the *interval* of the respective axis and range in use by the *multiple-dimension measuring device*.

(4) A *tare* may be less than the minimum length marked on a *multiple-dimension measuring device* for each axis to which the *tare* refers.

(5) When a *tare* is used, it must be displayed.

- subsection (1) is to ensure that a tare function can only be used to reduce a length measurement.
- subsection (2) is meant to a) allow an operator to see that the tare is active when it is called for as well as to prevent the inadvertent use of the tare function when it isn't called for and b) allow a customer to see that a tare is being used.
- subsection (3) is to ensure accurate measurement
- subsection (4) allows a tare value to be less than 12 d. (section 32)
- subsection (5) shows the amount of the tare.

20 A *multiple-dimension measuring device* must not provide any measurement *registration*, or must indicate an error message with its measurement *registration*, if the object being measured

- (a) is smaller than the minimum *dimensions* marked on the device;
- (b) is larger than the maximum *dimensions* marked on the device plus 9 d; or
- (c) has *dimensions* that exceed the measurement capability of the device.

- this section requires that an MDMD either not provide measurements or display an error message with the measurements, when the measurements of an object are beyond the marked capabilities of the MDMD.
- paragraph a) also applies to net measurements that are less than 12 d as a result of the use of a tare.
- paragraph b): An MDMD can blank at the marked maximum length or any number of additional "d" up to + 9 d. For example, an MDMD that blanks at maximum length + 4 d is acceptable.
- paragraph c) is to address devices that can't measure maximum height and maximum width at the same time but that can otherwise measure the maximum height of narrow objects or the maximum width of short objects.

21 (1) A *multiple-dimension measuring device*, its auxiliary equipment or its system must record and provide every customer, either by printed statement or electronic data transmission, the following information in respect of each object measured by the device:

- (a) the identification number or code of the object; and
- (b) when it determines the weight of the object for postage, freight or storage charges, the weight of the object;
- (c) when it determines the *hexahedronal dimensions* of the object for postage, freight or storage charges,
 - (i) the *hexahedronal dimensions* of the object,
 - (ii) the *dimensional weight* of the object if calculated, and
 - (iii) if more than one device or measuring element is installed in the same premises, the device identification.

sub section 21 (1)

- the information is provided to the customer to assist the customer when he or she has a question or a concern about the measurements or the transaction.
- the information can be provided by either the MDMD itself or some other component in the system.
- this subsection applies in non-retail locations such as a couriers sorting facility.
- this subsection only applies when the packages are to be invoiced by dimensions or weight.
- the subsection does not specify when the information must be provided.
- the information is normally included on the customers invoice but could alternatively be sent to the customer in electronic form.

object identification [paragraph (a)];

- this is typically being done with a bar code on the package or object and a corresponding number/code provided on the invoice for the package.
- the object identifier must be accompanied by either the weight [paragraph (b)] or the dimensions of the object [paragraph (c)].

weight of the object [paragraph (b)];

- when the MDMD or its system includes a scale, this is the actual weight of the object as determined by the scale.
- this terms and conditions does not prohibit manually entered weights however when used, they must be used in a manner that ensures accurate measurement. [see paragraph 29(a)]
- when the weight of the object is used to determine the fee for the package, 21 (1) (c) does not apply.

hexahedronal dimensions [paragraph (c)];

- they are usually presented as L x W x H with a unit of measurement. (section 16)
- when the hexahedronal dimensions of the object are used to determine the fee for the package, the weight of the package does not have to be provided.

dimensional weight [sub paragraph (c) (ii)];

- dimensional weight is a calculated value, it is not a weight.
- it is typically calculated using a formula that divides the hexahedronal dimensions or hexahedronal volume of an object by a conversion factor.
- the conversion factor and formula are both determined by the courier.
- dimensional weight is only required when it has been calculated which would probably be most transactions.
- the dimensional weight may have a unit when given on an invoice, but it must be clearly identified as a dimensional weight [sub section 21(3)]. For example, the letters “dw” or “dim” between the value and the unit.

device identification [sub paragraph (c) (iii)];

- this refers to the MDMD that measured the object.
- the owner/operator of the MDMDs determines how to identify the MDMDs.
- this sub paragraph is to facilitate the investigation of complaints or other issues related to the measurements used in a transaction.
- it only needs to be provided once on an invoice if all of the packages were measured by the same MDMD.

(2) A *multiple-dimension measuring device*, its auxiliary equipment or its system must provide every customer who is present at the time of measurement with a printed statement setting out the following information in respect of each object measured by the device:

- (a) the identification number or code of the object; and
- (b) when it determines the weight of the object for postage, freight or storage charges, the weight of the object;
- (c) when it determines the *hexahedronal dimensions* of the object for postage, freight or storage charges,
 - (i) the *hexahedronal dimensions* of the object,
 - (ii) a statement indicating that the *dimensions* are those of the smallest *hexahedron* within which the object can be contained,
 - (iii) the *dimensional weight* of the object, if calculated,
 - (iv) the conversion factor used to calculate the *dimensional weight* of the object, and

- (v) a statement indicating that the *dimensional weight* of the object is a calculated value obtained by applying a conversion factor to those *dimensions* and is not the actual weight of the object, if the *dimensional weight* is calculated.

sub section 21 (2)

- the information is provided to the customer to assist the customer when he or she has a question or a concern about the measurements or the transaction.
- the information can be provided by either the MDMD itself or some other component in the system.
- this subsection applies in situations where the customer is present at the time of measurement such as a retail store.
- the information must be provided to the customer at the time of measurement.
- this subsection only applies when the packages are to be invoiced by hexahedronal dimensions or weight.

smallest hexahedron statement [sub paragraph (c) (ii)];

- the statement is only required when the hexahedronal dimensions are used in the determination of the fee.
- the text of the statement can be different than the text in the subparagraph as long as it conveys the same message.
- the statement can be preprinted on the receipt or invoice.
- the purpose of the statement is to make clear to a customer that the declared dimensions are of the smallest hexahedron.

conversion factor [sub paragraph (c) (iv)];

- this is the factor (for example, 6 000 cm³ / kg) that is being used to convert the hexahedronal dimensions or volume of the measured object into a dimensional weight.
- the factor is only required when the dimensional weight has been calculated.
- it's required for direct sales transactions to ensure that customers who do not have a contract with the courier will know what factor was used in the determination of the fee.

dimensional weight statement [sub paragraph (c) (v)];

- the statement is only required when a dimensional weight has been calculated.
- the text of the statement can be different than the text in the subsection as long as it conveys the same message.
- the statement can be preprinted on the receipt or invoice.
- the purpose of the statement is to make clear to a customer that the dimensional weight is not the actual weight of the object but rather a calculated value.

- (3) The *dimensional weight* of an object must be clearly identified as a *dimensional weight*.

sub section 21 (3)

- a dimensional weight can be confusing because it's often presented with a unit of measurement and sometimes mixed on invoices with actual weights.
- because of this, a dimensional weight must be identified as such (i.e., a code, a message, a symbol, etc).

22

- (1) If the information required to be provided under section 21(1) is provided by electronic data transmission, a *multiple-dimension measuring device*, its auxiliary equipment or its system must retain the information for a minimum of 90 days following the date on which the information was initially transmitted by the device, its auxiliary equipment or its system.

- (2) The information required under section 21(2) (c) (ii), (iv) and (v) may be preprinted on the printed statement.

sub section 22 (1)

- this does not apply to information that is provided to customers via hard copy invoices or statements.
- this subsection does two things
 - it ensures that a customer has enough time to review his invoicing information and
 - provides a customer with access to the information should his or her files be lost or damaged after receipt of the original data transmission.

sub section 22 (2)

- the statements only need to be provided once on the printed statement.
- the conversion factor only needs to be provided once on the invoice unless more than one conversion factor is used.

23 The adjustable components of a *multiple-dimension measuring device* must maintain a setting after any adjustment is made.

the purpose of this section is to ensure dependable and accurate devices.

24 (1) Access to the metrological functions and the adjustable components of a *multiple-dimension measuring device* must be protected by means of readily accessible and observable physical seals or electronic sealing, such as an audit trail, that make apparent any accessing of the metrological functions or adjustable components.

(2) The information contained in an audit trail must be available and printable on site

(3) In this section, "audit trail" means an electronic feature that counts the number of changes made to the calibration or configuration parameters of the device or records the values related to these changes.

subsection 24 (1)

- seals are required to restrict access to metrological functions and adjustments that are necessary for the correct operation of an MDMD.
- the seals need to be readily visible so that missing or broken seals will be visible to MDMD users who may then take the necessary steps to deal with the situation.
- the NoA will provide sealing information.
- an audit trail method of security is an acceptable alternative to physical seals but it must be readily accessible so as to allow easy determination of any changes made to the device.
- an audit trail is subject to the Terms and Conditions for the Approval of Metrological Audit Trails (March 01, 2006).
- sealing may be a combination of physical seals and an audit trail.

subsection 24 (2)

- subsection (2) is to assist an inspector during an inspection.
- the print requirement is to eliminate the need for an inspector to copy information by hand.

25 A *multiple-dimension measuring device* that is equipped with interfaces that allow the connection of auxiliary equipment must be designed so that

(a) the metrological functions of the device are not adversely affected by either the operation of the auxiliary equipment or by disturbances or influence factors acting on the auxiliary equipment or interfaces; and

(b) the interfaces do not allow access to the metrological functions and adjustable components of the device.

section 25, paragraph (a)

- the cables, connectors and interface ports or ancillary equipment should not be an access route by which interference or disturbances can enter and detrimentally affect the operation and performance of the MDMD or the system as a whole.

section 25, paragraph (b)

- the interface ports should not be a way to access the metrological functions and adjustments of the MDMD.
- this requirement does not apply to ports designed for setting up and making adjustments to an MDMD and that would be sealed as per subsection 24 (1).

- 26 A *multiple-dimension measuring device* must be designed to operate over a temperature range of – 10 °C to + 40 °C unless a different temperature range is specified by its manufacturer, in which case it must operate over a temperature range of at least 30 °C.
- this section requires that MDMDs operate satisfactorily over the temperature range that MDMDs are usually used at.
 - the 30 °C reference in this section represents a temperature range and not a specific temperature.
 - when expressing metric temperatures, there must be a space between the numeric value [40] and the symbol [°C]. For example, 40 °C not 40°C.

MARKING

- 27 (1) A *multiple-dimension measuring device* must be clearly and permanently marked with the following information:
- (a) the approval number;
 - (b) the manufacturer's name;
 - (c) the model designation;
 - (d) a serial number;
 - (e) the minimum and maximum length for each axis;
 - (f) the *interval* for each axis and measuring range;
 - (g) the minimum and maximum operating speeds; and
 - (h) the temperature range, if other than – 10 °C to + 40 °C.
- (2) The information must be marked on the *multiple-dimension measuring device* or on a descriptive plate affixed to it that is clearly visible at all times.
- the information is provided for identification purposes and to inform operators of the capabilities of the MDMD.
 - the information marked must reflect the approved values and limits.
 - the minimum length referred to in 27 (1) (e) is the minimum length that the MDMD can be used to measure (i.e., 12 d).
 - some of this information may not be applicable to some MDMDs. (i.e., multiple measuring ranges, operating speeds)

- 28 If there are any restrictions, limitations or conditions on the use of a *multiple-dimension measuring device* or if there are any special applications or uses for it, that information must be clearly and permanently marked on the device or be posted in close proximity to the device so as to be clearly visible to the operator and any customer who is present at the time of the measurement.
- the purpose of this section is to ensure that operators are aware of any applications and restrictions that apply to the MDMD they are using so that they may take whatever precautions are necessary.
 - this section also alerts a customer to these factors and may assist in preventing inaccurate measurements.
 - restrictions, limitations, etc for an MDMD are found on its NoA.

INSTALLATION AND USE

- 29 A *multiple-dimension measuring device* and any equipment or accessories connected to or used in conjunction with it must be installed, maintained and used in a manner that

- (a) ensures accurate measurement;
- (b) respects the parameters, restrictions, limitations and conditions of use set out in the notice of approval issued for the device;
- (c) is in accordance with the manufacturer's or importer's instructions;
- (d) does not detrimentally affect the performance of the device; and
- (e) does not facilitate the perpetration of fraud.

the purpose of this section is to establish conditions that will maximize the occurrence of accurate measurement results.

- 30 A *multiple-dimension measuring device* must be suitable for its intended use with respect to the elements of its design, composition and construction.
- this section places the responsibility to use a device that has features and capabilities which are suitable for the measurement task at hand, on the operator of a device.
 - factors such as interval size, capacities, units of measurement, operating speeds, shape restrictions, are usually considered.
- 31 Every *multiple-dimension measuring device* must be positioned and maintained so that all measurement indications and related information may be easily read, and the measurement of the object observed, by a customer who is present at the time of the measurement.
- the purpose of this section is to ensure that an MDMD is installed so that a customer can see the actual measurement process and the information displayed during the process.
 - this allows a customer to see that the measurement was done correctly or if he has questions about the process, discuss the concern with the operator.
 - customer line of sight is not required for secondary indications or supplemental information displayed away from the normal position of the customer.
- 32 The minimum net length to be measured by a *multiple-dimension measuring device* is 12 d for the axis and measuring range in use.
- the purpose of this section is to prevent the device from being used to measure an object for which the limit of error is inappropriately large in relation to a dimension of the object.
 - section 33 tells us that the limit of error is 1 d.
 - if we divide 1 d by a given length, also in terms of d, we can determine the limit of error as a percentage of the length. Some examples; $1\text{ d} \div 10\text{ d} = 10\%$, $1\text{ d} \div 5\text{ d} = 20\%$,
 - the 12 d restriction represents a limit of error of 8.3 %: $1\text{ d} \div 12\text{ d} = 8.3\%$
 - the minimum length that can be measured can be different for each axis.
 - the minimum length of each measuring range must be equal to or greater than 12 times its "d" value.
- For example, range 1 has a d = 5 mm and range 2 has a d = 10 mm. Range 1 must extend to at least 120 mm or 24 d.

PERFORMANCE

- 33 Subject to section 35, the acceptance and in-service limits of error for *registrations* and tests of a *multiple-dimension measuring device* are $\pm 1\text{ d}$ for the axis and measuring range in use.
- this limit of error applies regardless of the shape, material or position of the object being measured, the type of inspection being done (ie approval, initial, control, zone) or the design or type of the device.
 - this limit of error is the same as that of the United States (NIST Handbook 44) and OIML R129.
- 34 A *multiple-dimension measuring device* must perform within the applicable limits of error when it is tested

under controlled conditions for the following influence factors:

- (a) any voltage from – 15 % to + 10 % of the nominal voltage for devices that use alternating current electricity as a power source;
- (b) any voltage level at which the device is capable of displaying measurement *registrations* for devices powered by direct current electricity;
- (c) any temperature within the temperature range marked on the device or, if no range is marked, at any temperature within the range of – 10 °C to + 40 °C;
- (d) humidity variations at any level up to 85 % relative humidity, at any temperature within the temperature range specified for the device;
- (e) ambient light level variations, at any light level intensity from 100 lx to 1500 lx for devices using optical principles of operation;
- (f) any acoustic interference, at intensity levels of up to 100 db at the nominal centre frequency of the ultrasonic transducers used in the device, for devices using acoustic principles of operation; and
- (g) any other influence factor that may affect the device's performance.

- the purpose of this section is to provide device manufacturers with a set of conditions under which a device must be able to perform properly.

- paragraph g) is included to allow the Approval Services Laboratories to test features that are not covered by the other sections.

- these test conditions are for approval purposes and are not used during routine field inspections.

- 35 The difference between a measurement *registration* subjected to a disturbance, such as electromagnetic or electrostatic fields, short-time power reduction, electrostatic discharges, electrical bursts or other disturbances, and an undisturbed measurement *registration*, must not exceed 1 d. If the difference exceeds 1 d, the *multiple-dimension measuring device* must

- (a) blank the *registration* and prevent the transmission, printing and storage of measurement results;
- (b) provide an error message and prevent the transmission, printing and storage of measurement results; or
- (c) provide a measurement *registration* that is so completely unstable that it cannot be interpreted or transmitted into memory or to a printer as a correct measurement result.

- the purpose of this section is to provide MDMD manufacturers with conditions under which an MDMD must be able to either perform properly or respond in a specified way.

- these disturbances might be so strong that the MDMD won't be able to operate properly, so other responses are allowed (i.e., blanking, error messages).

CHANGES TO THE REGULATIONS

1. The portion of section 21 of the Weights and Measures Regulations before paragraph (a) is replaced by the following:
 - 21 Before being sold, leased or otherwise disposed of, a weighing machine (other than a weighing device to which the *Terms and conditionss Relating to Non-automatic Weighing Devices (1998)* apply) or a measuring machine (other than a multiple-dimension measuring device to which the *Multiple-dimension Measuring Device Terms and conditionss apply*) that is of a class, type or

design approved under section 3 of the Act, and any equipment or accessory attached to or used in conjunction with the machine that has or could have an effect on the accuracy of the machine and that was approved under section 3 of the Act shall be marked with the following information:

2. Subsection 65(2) of the Regulations is replaced by the following:

65 (2) Weighing devices to which the *Terms and conditionss Relating to Non-automatic Weighing Devices (1998)* apply and multiple-dimension measuring devices to which the *Multiple-dimension Measuring Device Terms and conditionss* apply are exempt from this Part.

Appendix B: Comparison Document of MC and US MDMD Requirements

MC Requirements			NTEP Requirements		
Markings (Section 1)			Markings (Section 1)		
MC Manual	MC Spec	Description	Pub. 14	Handbook 44	Description
1.1.1	27.1b	name of manufacturer	1.1	G-S.1	name of manufacturer
1.1.2	27.1c	model number	1.2	G-S.1	model number
1.1.3	27.1d	serial number	1.3	G-S.1	serial number
1.1.4	27.1a	approval number	1.5	G-S.1	approval number
1.1.5	27.1e	min and max dimensions	1.8.1	G-S.1	min and max dimensions
1.1.6	27.1f	interval or "d"	1.8.2	G-S.1	interval or "d"
1.1.7	27.1g	min and max operating speeds	1.8.4	G-S.1	min and max operating speeds
1.1.8		area for verification marks	none		
1.1.9	28	minimum spacing	1.8.6	G-S.1	limitations
	27.1h	temperature range	1.8.3	G-S.1	temperature range
LG-1.01	27.1	Lettering Permanence	1	G-S.1	Lettering Permanence
LG-1.02	27.1	Label/Plate Permanence	1.7	G-S.1	Label/Plate Permanence
1.3	5	Software markings	1.4	G-S.1	Software markings
1.6	28	Special Application	1.8.5	G-S.1	Special Application
1.6	28	Limitations	1.8.6	G-S.1	Limitation of Use
	27.2	Location of Markings	1.6	G-S.1	Location of Markings
none			1.9	G-S.1	Software Markings Location
1.7	29,30,31	Marking Control, Annunciators	none		
Indication and Display Features (Section 3)			Design of Indicating or Recording Elements (Section 2)		
MC Manual	MC Spec	Description	Pub. 14	Handbook 44	Description
3.1.1	9a	registrations in decimal format	2.2	S.1.2	registrations must be in a digital format
3.1.2	6a	indications of 1, 2 or 5	2.5.1, 2.5.2	S.1.5	registrations of 1, 2 or 5
3.1.3	6b	binary submultiple	2.5.3	S.1.5	binary submultiples
3.2.1	9a, 15b	reading results is easy, unambiguous	none		
3.2.2	9a, 15b	digits of uniform size, shape and character	2.2	S.1.2	registrations must be in a digital format
3.2.3	15b	no interference with interpretation of measurement	none		

3.2.4	16a	same unit of measurement of all axes	none		
3.2.5	16b	only one unit of measurement may be used	none		
3.2.6	16c	L,W,H and units marked and are acceptable	none		
3.2.7	15b	separated by decimal point or comma	none		
3.2.8		no fixed zeros	none		
3.2.9	16b	tare and net in same units	none		
3.2.10		rounding followed	none		
3.2.11		"L, W, H" indicated	none		
3.3.1		Video display - dedicated area for measurement display	none		
3.4.1		Volume displayed correctly (units, significant figures, etc)	none		
	17	If Volume displayed, dimensions must be provided on demand	2.4	S.1.4	Only volume indicated - test mode for dimensions
0.3, 0.4 inch division sizes not permitted			2.5.4, 2.5.5	S.1.5	Indirect Sales: 0.3 and 0.4 inch "d"
no spec for different "d"			2.5.6	S.1.5.2	"d" in x and y different from z
Recorded Representations (Section 4)			Design of Indicating or Recording Elements (Section 2)		
MC Manual	MC Spec	Description	Pub. 14	Handbook 44	Description
4.1	15c	permanent, legible, same units	2.2	S.1.2	registrations must be in a digital format
4.2	15b	clearly defined	none		
4.3	15a	same number of decimal places	none		
4.4	16b	unit conversion: proper values	none		
4.5	15b	G, N, T, Total Price, Unit Price in agreement	none		
Annunciators and Symbols (Section 5)			Design of Indicating or Recording Elements (Section 2)		
MC Manual	MC Spec	Description	Pub. 14	Handbook 44	Description
5.1	16c	Appropriate figures, words or symbols	none		
5.2	15b	Metrological annunciators properly defined	none		
5.3	15b	Names, symbols are suitably located	none		
5.4	16b	Unit key must automatically change indicated & printed G,N,T units	none		
5.5		DIM Weight Defined and Correct	none		
Agreement of Registrations (Section 6)			Design of Indicating or Recording Elements (Section 2)		
MC Manual	MC Spec	Description	Pub. 14	Handbook 44	Description
LG-6.01	15a	Digital values of like value - exact agreement	none		

LG-6.02	15b	Suitability of unit conversion	none		
Indicating Zero, Negative and Ready (Section 7)			Design of Zero and Tare (Section 4)		
MC Manual	MC Spec	Description	Pub. 14	Handbook 44	Description
7.1	14(2)	means to indicate zero or ready	2.1, 4.1	S.1.1, S.2	means to indicate zero or ready
7.2	13(1)	not-ready or off zero on both sides of zero			
7.3	14(1)	automatic maintain zero or ready, or inhibit	2.1, 4.1	S.1.1, S.2	inhibit measurements if not ready/zero
7.4		no + or - at zero	none		
7.5	18	display negative when gross < tare	2.3	S.1.3	negative values not displayed unless in tare mode
7.6	18	negative indication cannot be confused	none		
7.7	18	blanking display when under zero	none		
Limits of Indication (Section 8)			Design of Indicating or Recording Elements (Section 2, 11)		
MC Manual	MC Spec	Description	Pub. 14	Handbook 44	Description
LG-8.01	20a, 32	under minimum (12d)	2.7, 11	S.1.7	under 12 d
LG-8.02	20b, 20c	over maximum (max + 9d)	2.8, 11	S.1.8	over max + 9d
Zero Activate During Measurement (Section 9)			Design of Zero and Tares (Section 4)		
MC Manual	MC Spec	Description	Pub. 14	Handbook 44	Description
9	13(2)	zero/ready control interlock	4.2	S.2	zero/ready control interlock
Return to Zero (Section 10)			(Section)		
MC Manual	MC Spec	Description	Pub. 14	Handbook 44	Description
10	13,14	Return to Zero Test	2.1, 4.1		zero/ready condition
Tare (Section 11)			Design of Zero and Tare (Section 4)		
MC Manual	MC Spec	Description	Pub. 14	Handbook 44	Description
11.1.1	19(1)	Tare operates in backward direction only	4.3	S.2	Tare operates in backward direction only
11.1.2	15b	Entry of zero tare	none		
11.1.3	19(3)	d tare = d	4.4	S.2	d tare = d
11.1.4	20	Sum of Tare and Net weight < gross load capacity	none		
11.1.5		NET + Tare = GROSS weight	none		
11.1.6	16b	Tare - selecting units of measurement - accuracy and rounding.	none		
11.1.7		Automatic clearing of tares	none		
11.1.8		Tare non-additive	none		
11.1.9	19(2)	Visual confirmation of Tare entry	4.5	S.2	clear indication Tare has been taken
LG-11.01		Tare Test	none		

11.2.1		tare entry only at gross load zero	none		
11.2.2		Tare may be retained between transactions	none		
11.3.1		tare cancellation if there are means to indicate tare value	none		
11.3.2		Tare may be retained between transactions	none		
Segment Verification (Section 12)			(Section)		
MC Manual	MC Spec	Description	Pub. 14	Handbook 44	Description
12	11	Segment Verification Test	none		
Multiple Measuring Elements (Section 13)			Multiple Measuring Elements (Section)		
MC Manual	MC Spec	Description	Pub. 14	Handbook 44	Description
13.1.1	10b	Prohibit activation of measuring elements not in use	5.1	S.3	Prohibit activation of measuring elements not in use
13.1.2.	10a	Indicating which measuring element is used	5.2	S.3	Indicating which measuring element is used
13.1.3		Weighing elements are identified	none		
13.1.4	10a	Recording which weighing element is used	none		
13.1.5		Performing a function on a particular weighing element does not affect other elements	none		
13.1.6	14	Zero or ready must remain active	none		
	9b	Portable indicator			
Multiple Interval (Section 14)			(Section)		
MC Manual	MC Spec	Description	Pub. 14	Handbook 44	Description
14.1.1	7a	$d1 < d2 < d3$	none		
14.1.2		Gross = Net + Tare	none		
14.1.3		Gross = Net + Tare: exact agreement	none		
14.1.4		Tare: Rounding rules	none		
14.1.5	33	Tolerance function of range	none		
14.1.6	33	Keyboard or Platter Tare: meets tolerance for net loads	none		
	7b, c, d	Capacity of ranges	none		
Direct Sale (Section 15)			(Section)		
MC Manual	MC Spec	Description	Pub. 14	Handbook 44	Description
15	22, 31	Information as required by Spec 22	none		
Non-Metrological Functions (Section 16)			(Section)		
MC Manual	MC Spec	Description	Pub. 14	Handbook 44	Description
16	29	Non-metrological functions do not cause errors, perpetration of fraud	none		
Software Version Test (Section 17)			Markings (Section 1)		
MC Manual	MC Spec	Description	Pub. 14	Handbook 44	Description

17	5	Software Identification test	1.4	G-S.1	Software markings
Performance Tests (Part 3)			Performance (Sections 7, 8, 9, 10)		
MC Manual	MC Spec	Description	Pub. 14	Handbook 44	Description
3.01	36	Short Time Power Reduction (not performed)	none		
3.02	35a,b	Power Voltage	9	T.5.2	Power Voltage
3.03	36	Electrical Burst Test (not performed)	none		
3.04	36	Electrostatic Discharge (not performed)	none		
3.05	36	EM Susceptibility (not performed)	none		
3.06	3, 33	Warm Up	7	S.1.9	Warm Up
3.07	3, 33	Conveyor Belt Seam	none		
3.08	3, 33	Measurement Speed Test	none		
3.09	7,8	Interval of "d"			
3.10	26,33, 35c	Temperature range	10	T.5.1	Influence Factor
3.11	35d	Damp Heat (not performed)	none		
3.12	3, 33	Eccentricity	none		
3.13	3, 33	Drag Test	none		
3.14	33	Repeatability	8		Accuracy
3.15	3, 33	Minimum Spacing	none		
3.15.5	3, 33	Touching	none		
3.16	3, 33	Variable Orientation	none		
3.17	3, 33	Variable Object Shape	none		
3.18	3, 33	Variable Surface (only for palletized)	none		
3.19	3, 33	Protrusions (not performed)	none		
3.20	3, 33	Sensor/Emitter Obstruction	none		
3.21	35e	Radiated Light (not performed)	none		
3.22	35f	Acoustic Interference (not performed)	none		

Notes:

- 1) Table S.1.6 (Handbook 44) and Spec. 21, 22 (MC) contain marking requirements that are not always part of an approval evaluation, as this info is sometime instead to be provided by the billing system used in conjunction with the device.
- 2) Sealing requirements were not included in this comparison

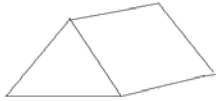
Appendix C: Illustration of Measurement Canada's Dimensional Standards

Dimensional Standards

Materials:

NYLATRON NSM

Dimensions:

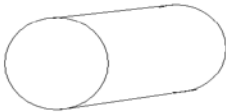


Triangular Prism 1 (L5m-A):

20 cm each side x 60 cm length

Triangular Prism 2 (L5m-B):

40 cm each side x 40 cm length

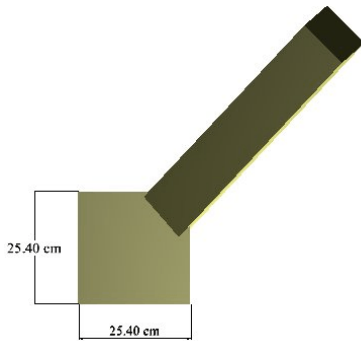


Cylinder 1 (L5m-C):

Ø 15 cm x 60 cm length

Cylinder 2 (L5m-D):

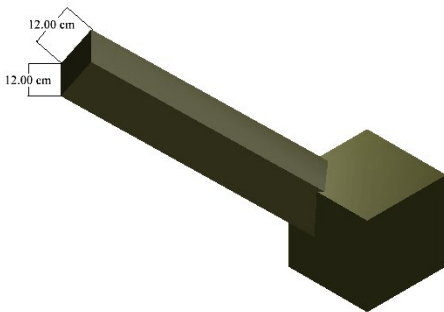
Ø 40 cm x 40 cm length



Irreg 1 (L5m-E):

Cube side = 25.4 cm

Extension = 90 cm total length from the corner of the box to the extremity of the extension (part of which will be inserted inside the cube) x 12 cm x 12 cm



Irreg 2 (L5m-F):

Cube side = 40 cm

Extension = 130 cm total length from the corner of the box to the extremity of the extension (part of which will be inserted in the cube) x 18 cm x 18 cm

Construction:

Fabrication tolerances for each box are as follows:

linear tolerance: ± 0.5 mm (± 0.02 inches)

angular tolerance: ± 0.5 mm (± 0.02 inches)

Thickness of the material: 9.525 mm (3/8 inch) to 12.7 mm (1/2 inch), depending on the design for the construction, #6 and #8 stainless steel woods screws.

The surfaces shall be perfectly parallel and perpendicular to within the above stated tolerances.

Irreg 1 and Irreg 2 must be constructed such that they are completely stable when placed in the position indicated in the drawings above.

Maximum weight of each standard: 15 kg.

All standards to be engraved with their name.

All surfaces shall be smooth, identified with an engraved number and have their nominal dimensions engraved in millimetres.

Appendix D: Attendees List

To be added

**Multiple Dimension Measuring Device Work Group
May 12-13, 2015 - Reynoldsburg, Ohio
Meeting Agenda**

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2. Review changes to NIST, Handbook 44, MDMD code since last meeting	3
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5. Review update to NTEP / MC Requirements Comparison Document	3
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Preliminaries

- i. **Introductions and Welcome** (*R. Kennington*)
- ii. **Reiteration of NTEP MDMD Work Group Mission** (*D. Flocken*)

Discussion: Mr. Darrell Flocken (NTEP Specialist) reviewed the mission of the MDMD Work Group (WG) as stated during the October 2014 WG meeting for the benefit of all participants. The mission of the WG is to deal with specific issues concerning MDMDs; i.e., to consider the requirements in NIST Handbook 44 (HB44) and make sure NTEP has a type evaluation checklist in place to verify compliance with HB44 and influence factor testing. NTEP has been asked for years to consider encompassing MDMD's under the us / Canada Mutual Recognition Arrangement. At a July 2014 NCWM meeting Mr. Gilles Vinet (MC) announced Canada wishes to consider including MDMDs under the MRA umbrella with the US. MC has requested to be lead laboratory. The NCWM Board of Directors is seeking input from MDMD WG with respect to this issue. This would be an annex to the current agreement.

- iii. **Goal of this Meeting** (*D. Flocken*)

Discussion: The goal for this meeting is to continue to develop both the MC / NTEP Specification Comparisons document and the update of the Publication 14 Checklist. In addition, the WG must develop a position on the request to add MDMD instruments to the MC / NCWM Mutual Recognition Agreement with MC being defined as the primary evaluation laboratory.

- iv. **Report – 2014 NCWM Annual Meeting** (*D. Flocken*)

Discussion/Update: The NCWM Interim Meeting was well attended and went well. No new items dealing with MDMD instruments were presented during the meeting. The one Specifications and Tolerances (S&T) Committee agenda item involving a device that can measure product in the bed of a truck or trailer was recommended for withdraw due to lack of additional follow-up information from the manufacturer and submitter of the item (i.e. LoadScan, Ltd., New Zealand)..

- v. **Report – Activity of Measurement Canada** (*Isabelle Tremblay and Pascal Turgeon*)

Discussion/Update: Ms Tremblay reported that they had received 2 evaluation applications so far in 2015. Both of these applications were for new devices. It was also reported that all recent MDMD evaluations were completed in the defined goal of no more than 120 days from receipt of the application to the issuing of the Notice of Approval. Ms Tremblay also reported that several of the existing tests in the MC Laboratory Manual have been revised and the differences will be reviewed during the Publication 14 document review. Mr. Turgeon reported that MC is still considering the adoption of the OMIL R129 standard however, no changes in this activity have occurred since the October 2014 WG meeting

- vi. **Report – Recent NTEP MDMD Type Evaluation Activity** (*J. Truex*)

Discussion/Update: It was reported that the Ohio NTEP laboratory has had 7 evaluation assignments so far in 2015, five of which were for new devices and two were for amendments to existing certificates.

Carry Over Items

1. Review meeting summary from October 2014 meeting

A copy of the October 2014 Meeting Summary can be downloaded at www.ncwm.net/ntep/sectors/mdmd/archive.

2. Review changes to NIST, Handbook 44, MDMD code since last meeting

No changes to Handbook 44 have been made since the WG's October 2014 meeting.

3. Review changes to NCWM, Publication 14, MDMD Checklist

No changes to Publication 14, MDMD Checklist have been made since the WG's October 2014 meeting.

4. Review changes to Measurement Canada MDMD Code and Terms and Conditions

No changes to the Canadian MDMD Code.

5. Review update to NTEP / MC Requirements Comparison Document

Source: Work Group

Background /Discussion: A copy of the document, which included the changes that had been agreed to at the October 2014 meeting, was reviewed by the WG. A few typographical errors were found and corrected. Members of the WG decided that the reference for the need of a "Portable indicator" as specified on line 107 of the Excel MDMD Comparison document would remain even though it was also established that this was a field enforcement item. It was also agreed that line 107 of the document would be hidden.

Recommendation: The WG accepted the document as presented and changed as defined above. The document will be reviewed as changes to Handbook 44 and/or Publication 14 are adopted.

Status: On going

6. Review update to new draft revision of Publication 14, MDMD Checklist

Source: Work Group

Background /Discussion: Mr. Robert Kennington (Quantronix, Inc.) reviewed the changes made to the MDMD Checklist that was agreed to during the October 2014 WG meeting. During the review, the following changes were suggested.

1. Add a Section "D" to the Technical Policy section of Pub 14 and include the words "Longitudinal" and "Traverse" along with their definition.
2. Change the title of Section 13 from "Eccentricity" to "Position".
3. The WG agreed that the Position Test needed examples of test object orientation. Ms. Tremblay agreed to develop the examples and send them to Darrell for insertion into the WG's draft document.
4. Replace the existing test object configurations with new examples provided by MC.
5. Change the title of Section 20 from "Jam Test" to "Drag Test".
6. The follow changes are editorial in nature and will be changed in the next draft document.
 - a. Change all references to "CM" to "inches".
 - b. Change all references of "DUT" to "device".
 - c. Change wording in appropriate sections to permit the transmission of measurement values, that are incorrect or outside the instruments measurement range, providing the data transmitted includes an

error code or message. Reference paragraph 2.8.2. of the existing document for an example of the desired wording.

Measurement Canada mentioned that there have been a few proposed changes to some of the test procedures that were added to Publication 14 at the last WG meeting. They also mentioned that one of the existing tests was separated into two separate tests. Due to available time and the fact that these changes were not yet adopted or proven, members of the WG decided to hold off with adding them into draft copy of Publication 14. Members of the WG did agree to revisit these changes at the next meeting.

Recommendation: The changes mentioned in items 1 thru 6 above were agreed and the document will be updated and reviewed at the next meeting.

Status: On going

7. Discussion of US / Canadian Mutual Recognition Agreement – MC request

a. Recommendation for the MC Checklist to be primary evaluation document, and

b. Recommendation for MC to be primary evaluation laboratory

Source: NCWM Board of Directors and NTEP Committee

Background /Discussion: At the suggestion of Measurement Canada, the NCWM Board of Directors and the members of the NTEP Committee has asked the WG to consider recommending the Measurement Canada Evaluation Checklist be the primary document for the evaluation of MDMD Devices and in addition, that the Measurement Canada Evaluation Laboratory be identified as the primary laboratory for the evaluation of MDMD devices submitted under the MRA.

The WG discussed these two requests as a single item and developed the following position on the item and offers the counter proposal shown below.

“With regards to the MDMD position of the addition of the Multiple Dimensioning Measuring Device (MDMD) addition to the US / Canada Mutual Recognition Agreement, the MDMD WG submits the following decisions from their May 2015 Meeting.

The WG, consisting of 17 registered participants rejected the recommendation to add Multiple Dimensioning Measuring Devices to the MRA as presented by the NCWM Board of Directors and the NTEP Committee. The recommendation consisted of the stipulation that the Measurement Canada evaluation Checklist be the Primary Evaluation Document and that the Measurement Canada Evaluation Laboratory be designated the Primary Evaluation Laboratory. The decision was based on a show of hands of the 17 participants present. The show of hands was 1 in favor, 12 opposed and 4 abstained. (Meeting participants consisted of individuals ranging from users, manufacturers, laboratory personnel, and Canadian & USA Officials.)

The justification for the rejection is:

1. Concerns regarding the device evaluation times.
2. Loss of evaluation knowledge and experience in the USA Laboratory.
3. Concern of a single lab being impacted by budget and/or personnel changes.
4. A single lab is not conducive to the idea of mutual recognition.

The MDMD WG offers the following recommendation and if agreed too, will support the addition of Multiple Dimensioning Measuring Devices to the MRA provided:

1. Evaluation data from either a NTEP authorized laboratory or Measurement Canada can be used by both countries in the issuance of their respective certifications.
2. A MC / NTEP evaluation checklist document be created and accepted by both NTEP and MC.
3. A common performance evaluation results document be created and accepted by both NTEP and MC.

The decision was based on a show of hands of the 16 participants present. The show of hands was 12 in favor, 2 opposed, and 2 abstained. (Meeting participants consisted of individuals ranging from users, manufacturers, laboratory personnel, Canadian and USA Officials. One member of industry had to leave the meeting before the show of hands for this recommendation was called for.)”

Recommendation: The WG recommends that their position be forwarded to the NCWM Board of Directors and the members of the NTEP Committee.

Status: On-going

8. Report on progress from multi-interval operation requirements subgroup

Source: Multi-Interval Operation Requirements Subgroup

Background /Discussion: During the October 2014 meeting the WG agreed to form a small subgroup charged with the task to develop requirements that address multi-interval operation for inclusion into both HB-44 and Pub 14. Members of the subgroup are as follows: Mr. Darrell Flocken, Mr. Rick Harshman, Mr. Scott Davidson, Mr. Justin Rae, and Mr. Scott Wigginton. Although the WG neglected to assign a lead person, Mr. Harshman hosted a teleconference with members of the subgroup in April 2015. All members of the subgroup participated with the exception of Mr. Wigginton, who was unable to do so because of a work conflict. Ms. Isabelle Tremblay (MC) requested and was granted permission to participate in support of Mr. Rae.

Members of the subgroup acknowledged that the MDMD Code of NIST Handbook 44 (HB 44) does not contain any requirements pertaining to the use of multi-intervals on an MDMD. It was agreed that before type evaluation criteria could be developed and added to NCWM Publication 14, requirements that address the use of multi-intervals would first need to be added to HB 44 and this then became the focus of the subgroup discussion. Mr. Rae summarized and explained MC’s type evaluation criteria specifically pertaining to the use multi-intervals on MDMDs and how it compared to similar corresponding criteria in OIML R129. From the discussion that took place, members of the subgroup were able to identify five areas they believed would need to be addressed either by changing existing HB 44 MDMD code requirements or adding new code requirements as follows:

1. HB 44 MDMD code paragraph T.2.3., despite its title (i.e., Multi-interval (Variable Division-Value) Devices) was never intended to apply to devices that measure using multi-intervals in two or more partial measuring ranges within the same axes. Instead, the paragraph applies to devices that measure to a different division value in at least one of the dimensioning axes in comparison to the other two. To differentiate between these two applications, the subgroup agreed to propose changes to T.2.3. and to propose a new paragraph be added that addresses the application of tolerances on “mixed interval devices.”
2. The subgroup considered whether or not additional requirements were needed in HB-44 to address the taking of tare on a multi-interval device. It was agreed that requirements were needed to address the following views of the subgroup:
 - o The maximum allowable tare on a device with multi-interval should be the capacity of the lowest range of the axis in which the tare is to be taken.
 - o The net value that results from subtracting a tare value in a lower partial measuring range from a gross value indication in a higher partial measuring range, should always be in correct mathematical

agreement and to the nearest division of the measuring range in which the net value occurs. It was recommended that examples be provided to make clear correct mathematical agreement of the result after subtraction.

3. Members of the subgroup agreed that Table S.4.1. a. Marking Requirements for Multiple Dimension Measuring Systems should be expanded to include the marking of the minimum and maximum dimensions for each range since multi-interval devices have more than one partial measuring range in at least one of the dimensioning axes.
4. The subgroup felt there is a need to define the relationship of the different ranges that might use multi-intervals as is done in MC and OIML type evaluation criteria. The following are some example relationships specified in OIML R129 (note that similar relationships are expressed in MC standards):
 - $dx1 = dy1 = dz1, dx2 = dy2 = dz2$, etc. (example if all 3 axes were multi-interval.) This same relationship would apply if only 2 axes used multi-intervals. In that case $dx1 = dy1, dx2 = dy2$, etc.);
 - scale intervals $d1 < d2 < d3 \dots dr$;
 - $min = min1, max = max1, max1 = min 2$, etc.

Additionally, the subgroup believes HB 44 needs to specify which of the three axes are permitted to provide measurements using multi-intervals. Is it one, two, or all three?

5. The subgroup agreed with MC that the minimum of any particular partial measuring range can be no smaller than $12d$, where “d” is the measurement interval of that range. This requirement is similar to the minimum load requirement on a scale and takes into account the fact that large errors (as a percentage of the load being weighed) can result when small loads are weighed due to digital rounding and the allowable tolerance.

Mr. Harshman and Mr. Flocken volunteered to develop some draft proposals for the WG to consider that addressed each of the five items. Providing this work could be completed by the May 2015 WG meeting, it was agreed that the proposals would be presented to the WG for further consideration at that meeting.

Recommendation: At the May 2015 WG meeting, Mr. Harshman and Mr. Flocken summarized the discussions of the subgroup concerning the five areas that had been identified by the subgroup. A draft NCWM Form 15 proposal intended to address the first three areas of the five shown in the list above was circulated to members of the WG. Mr. Harshman summarized the proposal and explained why the subgroup believed the changes being proposed were needed. The WG agreed that the changes being proposed are needed and after suggesting some minor editorial changes to some of the draft language in the proposal, recommended it be submitted to the NCWM for consideration by the regional weights and measures associations during their fall 2015 meetings. The NCWM Form 15 proposal, as amended and accepted by the MDMD WG has been inserted as an attachment to this report.

With regard to items 4. and 5. on the list, it was believed that additional input from the WG was needed before proposals could be developed to address these areas. One concern raised by Mr. Flocken with respect to item 4. is if two boxes were run simultaneously through the measuring area, the first box in a higher measuring range than the second box, the second box could not be measured unless ready zero is first returned. With respect to item 5. some WG members questioned the purpose of restricting from use the first 12 divisions of each measuring range and how this is to be applied to the different partial measuring ranges of an MDMD with multi-intervals. Ms. Tremblay and Mr. Pascal Turgeon (MC) explained both the purpose of the requirement and how MC applies the $12d$ minimum to each partial measuring range of a multi-interval MDMD. Example illustrations of acceptable and unacceptable markings (min and max) of the different partial measuring ranges in relation to different values of “d” were also provided using a white board. In conclusion, the WG agreed that both items 4. and 5. also needed to be addressed in HB 44 and Mr. Flocken agreed to develop some draft language for the WG to consider at its next face to face meeting concerning these two remaining items.

Status: On-going

9. Develop Form 15's identified in Requirements Comparison Document

Source: Work Group

Background /Discussion: During the October 2014 meeting several items were identified as changes or additions to Handbook 44. These items are identified in the Requirements Comparison Document.

Recommendation: Using the information from the Requirements Comparison Document, the WG should complete the necessary forms (Form 15) to be submitted into the Handbook 44 adoption process.

No action was taken on this item. It will be revisited during our next meeting. (If Rick Harshman or Darrell Flocken have available time they will develop draft documents for the WG to review.) It was noted that the item must be presented to a minimum of two regional meeting before it can move on to the National S&T Committee.

Status: On going

NEW ITEMS

No new items were presented to the WG.

CLOSING DISCUSSION

10. Review meeting activities and conclusions

11. Define next steps (if needed)

12. Next meeting

The WG agreed that they need to meet again in the next 6 months to keep the momentum of the update to Publication 14 moving forward. After a brief review of available dates the WG agreed to meet again on September 22nd and 23rd. The Ohio NTEP Laboratory agreed to host the meeting for the third consecutive time. Once approved by the NCWM Board of Directors and the NTEP Committee the members will be notified via email and the dates will be published on the NCWM Website.

13. Attachments

Attachment to agenda Item-8: Draft Form 15 NCWM proposal to amend NIST Handbook 44

National Conference on Weights and Measures / National Type Evaluation Program

Form 15: Proposal to Amend NIST Handbooks

General Information (See Instructions)			
1. Date:	2. Regional Association(s): ___ Central (CWMA) ___ Northeastern (NEWMA) ___ Southern (SWMA) ___ Western (WWMA)		3. Standing Committee: ___ L&R ___ S&T ___ PDC
4. Submitter Name: Rick Harshman (NIST OWM) on behalf of the Multiple Dimension Measuring Devices Work Group			
5. Street Address:			
6. City:	7. State:	8. Zip Code:	9. Country:

10. Phone Number:	11. Fax Number:	12. Email Address:
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Proposal Information (See Instructions)

13. Purpose:

14. Handbook to be Amended:

X NIST Handbook 44 ___ NIST Handbook 130 ___ NIST Handbook 133

Section: 5.58 Multiple Dimension Measuring Devices (MDMD)

Paragraphs: Add new subparagraphs S.2.2.1. and S.2.2.2. and amend Table S.4.1.a. and paragraph T.2.3.

15. Proposal: The following three changes are proposed:

- 1) *Add new sub-paragraphs S.2.2.1. Maximum Value of Tare for Multi-Interval (Variable Division- Value) Devices and S.2.2.2. Net Values, Mathematical Agreement beneath existing paragraph S.2.2. Tare as follows:*

S.2.2. Tare. – The tare function...

S.2.2.1. Maximum Value of Tare for Multi-Interval (Variable Division-Value) Devices. – A multi-interval device shall not accept any tare value greater than the maximum capacity of the lowest range of the axis for which the tare is being entered.

S.2.2.2. Net Values, Mathematical Agreement. - All net values resulting from a device subtracting a tare entry from a gross value indication shall be indicated and recorded, if so equipped, to the nearest division of the measuring range in which the net value occurs. In instances where the tare value entered on a multi-interval device is in a lower partial measuring range (or segment) than the gross indication, the system shall either alter the tare entered or round the net result after subtraction of the tare in order to achieve correct mathematical agreement.

The following example (of a multi-interval device having two partial measuring ranges for the “x” axis) and accompanying two tables are provided to further clarify the two acceptable methods a device can use to achieve mathematical agreement when tare has been entered in a lower partial measuring range than the gross indication:

Example multi-interval device having two partial measuring ranges for the “x” axis:

- Partial measuring range 1: 0 – 100 inches by 0.2 inch
- Partial measuring range 2: 100 – 300 inches by 0.5 inch

Table 1: Examples of Acceptable Altering of Tare to Achieve Accurate Net Indication

<u>Gross Indication of Item Being Measured</u>	<u>Tare Entered</u>	<u>Value of Tare after Being Altered by the Device</u>	<u>Acceptable Net Indication</u>
<u>154.5 inches</u>	<u>41.2 inches</u>	<u>41.0 inches</u>	<u>113.5 inches</u>
<u>154.5 inches</u>	<u>41.4 inches</u>	<u>41.5 inches</u>	<u>113.0 inches</u>

Table 2: Examples of Acceptable Rounding of the Net Result (Following the Subtraction of Tare) to Achieve Accurate Net Indication

<u>Gross Indication of Item Being Measured</u>	<u>Tare Entered</u>	<u>Net Result Before Rounding (Gross Indication minus Tare Entered)</u>	<u>Acceptable Net Indication Rounded to Nearest 0.5 inch</u>
<u>154.5 inches</u>	<u>41.2 inches</u>	<u>113.3 inches</u>	<u>113.5 inches</u>
<u>154.5 inches</u>	<u>41.4 inches</u>	<u>113.1 inches</u>	<u>113.0 inches</u>

- 2) *Amend Table S.4.1.a. Marking Requirements for Multiple Dimension Measuring Equipment as follows:*

Table S.4.1.a. Marking Requirements for Multiple Dimension Measuring Systems				
	Multiple Dimension Measuring Equipment			
	Multiple Dimension Measuring Device and	Indicating Element not Permanently Attached to	Multiple Dimension Measuring Element not	Other Equipment (1)

To Be Marked With .:	Indicating Element in Same Housing	Multiple Dimension Measuring Element	Permanently Attached to the Indicating Element	
Manufacturer's ID	x	x	x	x
Model Designation	x	x	x	x
Serial Number and Prefix	x	x	x	x (2)
Certificate of Conformance Number (8)	x	x	x	x (8)
Minimum and Maximum Dimensions for Each Axis for Each Range in Each Axis (3)	x	x	x	
Value of Measuring Division, d (for each axis and range)	x	x	x	
Temperature Limits (4)	x	x	x	
Minimum & Maximum speed (5)	x	x	x	
Special Application (6)	x	x	x	
Limitation of Use (7)	x	x	x	

3. Amend paragraph T.2.3. Multi-Interval (Variable Division-Value) Devices and add a new paragraph T.2.4. Mixed-Interval Devices as follows:

T.2.3. Multi-interval (Variable Division-Value) Devices. – For multi-interval (variable division-value) devices, When there exists two or more partial measuring ranges (or segments) specified for any of the “dimensioning” axes (length (x), width (y), or height (z)) and the division values corresponding to those partial measuring ranges (or segments) within the same “dimensioning” axis differ, the tolerance values are shall be based on the value of the ~~device~~ division of the range in use.

T.2.4. Mixed-interval Devices. - For devices that measure to a different division value in at least one dimensioning axes and all axes are single range, the tolerance values shall be based on the value of the division of the axis in use.

16. Justification:

17. Other Contacts:

18. Other Reasons For:

19. Other Reasons Against:

20. Evidence:

21. Additional Considerations:

22. Suggested Action:

☐ Recommend NCWM Adoption ☐ Developing Item ☐ Informational Item ☐ Other (Please Describe):

23. List of Attachments:

For Regional Use Only

Comments:

**Multiple Dimension Measuring Device Work Group
September 22-23, 2015 - Reynoldsburg, Ohio
Meeting Summary**

i. Introductions and Welcome (R. Kennington).....	Error! Bookmark not defined.
ii. Reiteration of NTEP MDMD Work Group Mission (D. Flocken).....	Error! Bookmark not defined.
iii. Goal of this Meeting (D. Flocken).....	Error! Bookmark not defined.
iv. Report – 2015 NCWM Annual Meeting (D. Flocken).....	Error! Bookmark not defined.
v. Report – Recent Measurement Canada Type Evaluation Activity (I. Tremblay / P. Turgeon).....	Error! Bookmark not defined.
vi. Report – Recent NTEP MDMD Type Evaluation Activity (T. Buck)	Error! Bookmark not defined.
Carry Over Items	3
1. Review meeting summary from May 2015 meeting	3
2. Review changes to NIST, Handbook 44, MDMD code since last meeting	3
3. Review changes to NCWM, Publication 14, MDMD Checklist	3
4. Review changes to Measurement Canada MDMD Code and Terms and Conditions	3
5. Review update to NTEP / MC Requirements Comparison Document	3
6. Review update to new draft revision of Publication 14, MDMD Checklist	3
7. Review results of the NTEP / MC MRA discussion at the 2015 NCWM Annual meeting.....	3
8. Report on progress from multi-interval operation requirements subgroup.....	4
9. Develop Form 15's identified in Requirements Comparison Document	5
NEW ITEMS	5
CLOSING DISCUSSION	6
10. Review meeting activities and conclusions	6
11. Define next steps (if needed)	6
12. Next meeting	6

Glossary of Acronyms and Terms

Acronym	Term	Acronym	Term
NIST	National Institute of Standards and Technology	NTEP	National Type Evaluation Program
MDMD	Multiple Dimension Measuring Device	OIML	International Organization of Legal Metrology
MC	Measurement Canada	OWM	Office of Weights and Measures
MRA	Mutual Recognition Arrangement	R	Recommendation
NCWM	National Conference on Weights and Measures	WG	Work Group

i. **Introductions and Welcome** (*R. Kennington*)

ii. **Reiteration of NTEP MDMD Work Group Mission** (*D. Flocken*)

Discussion: Mr. Darrell Flocken (NTEP) reviewed the mission of the MDMD WG as stated during the October 2014 and May 2015 WG meeting for the benefit of all participants. The mission of the WG is to deal with specific issues concerning MDMDs; i.e., to consider the requirements in NIST Handbook 44 (HB44) and make sure NTEP has a type evaluation checklist in place to verify compliance with HB44 and influence factor testing. NTEP has been asked for years to consider encompassing MDMD's under the US / Canada Mutual Recognition Arrangement (MRA). At a July 2014 NCWM meeting Mr. Gilles Vinet (MC) announced Canada wishes to consider including MDMDs under the MRA umbrella with the US. MC has requested to be lead laboratory. The NCWM Board of Directors is seeking input from MDMD WG with respect to this issue.

iii. **Goal of this Meeting** (*D. Flocken*)

Discussion: The goal for this meeting is to continue to develop both the MC / NTEP Specification Comparisons document and the update of the NCWM Publication 14 Checklist. In addition, the WG agreed to revisit their current position related to the request to add MDMD instruments to the US / Canada MRA with MC being defined as the primary evaluation laboratory and the Measurement Canada Laboratory Evaluation Checklist being identified as the primary checklist.

iv. **Report – 2015 NCWM Annual Meeting** (*D. Flocken*)

Discussion: The NCWM 100th Annual Meeting was well attended and went well. No new items dealing with MDMD instruments were presented during the meeting. The one Specifications and Tolerances (S&T) Committee agenda item involving a device that can measure product in the bed of a truck or trailer was withdrawn from the S&T Committee's agenda in 2014 due to a lack of additional follow-up from the manufacturer and submitter of the item (i.e. LoadScan, Ltd., New Zealand)..

v. **Report – Activity of Measurement Canada** (*Pascal Turgeon*)

Discussion: Mr. Pascal Turgeon (MC) reported MC had not received or performed any MDMD evaluations since the WG's May, 2015 meeting. Mr. Turgeon reported that MC is still considering the adoption of the OMIL R129 standard; however, no changes in this activity have occurred since the October 2014 WG meeting.

vi. **Report – Recent NTEP MDMD Type Evaluation Activity** (*T. Buck, Ohio NTEP Laboratory*)

Discussion: It was reported that the Ohio NTEP laboratory had completed three evaluations on measuring devices since the WG's May, 2015 meeting. The three evaluations were-for amendments to existing certificates.

Carry Over Items

1. Review meeting summary from May 2015 meeting

A copy of the May 2015 Meeting Summary can be downloaded at www.ncwm.net/ntep/sectors/mdmd/archive.

2. Review changes to NIST, Handbook 44, MDMD code since last meeting

No changes to HB44 have been made since the WG's May 2015 meeting.

3. Review changes to NCWM, Publication 14, MDMD Checklist

No changes to Publication 14, MDMD Checklist have been made other than those agreed to during the WG's May 2015 meeting. See Item 6 for more details.

4. Review changes to Measurement Canada MDMD Code and Terms and Conditions

Mr. Pascal Turgeon (MC) reported that there were no changes to these documents since the WG's May 2015 meeting.

5. Review update to NTEP / MC Requirements Comparison Document

Discussion: Darrell Flocken (NTEP) reported that he and Mr. Turgeon (MC) worked together after the May 2015 meeting to update the MC reference numbers in the document. Mr. Turgeon confirmed the update but reported that some of the notes in the document were missed. Mr. Turgeon provided a copy of the documents with the location of the incorrect reference numbers. The document was reviewed for additional changes/updates based on the member's agreement to the additions to the MDMD Pub 14 Checklist.

Recommendation: Darrell Flocken agreed to correct the references to the MC documents and to update the Pub 14 column to add the proper section reference number. A copy of the updated document will be distributed with the meeting summary.

6. Review update to new draft revision of Publication 14, MDMD Checklist

Discussion: During the May 2015 WG meeting several proposed changes to the draft were discussed and agreed to by the WG. Members of the WG reviewed these changes for accuracy. During the review, the following items were discussed.

1. Section D in the Technical Policy contained the definitions of the terms "Longitudinal" and "Transverse". The members reviewed these definitions, which were copied from MC documentation. The discussions led to the recommendation that the second sentence in both definitions be removed and that the term "Vertical" and its definition be added.
2. It was pointed out that the "Amendments" list at the beginning of the document was missing some changes that were made during previous meeting. Mr. Darrell Flocken (NTEP) agreed to review all changes and correct the list.
3. During the review of the new test condition examples in the "Touching Objects Test," several members voiced their confusion on a few of the examples as there seemed to be a few duplicates. Mr. Pascal Turgeon (MC)

contacted the MC Laboratory and learned that there was an error in line 8 of the test sequence. The error was corrected.

4. A few editorial changes were suggested and made.

Recommendation: The members agreed that after completing the changes mentioned above, the document will be ready to submit to the NTEP Committee for adoption and inclusion into the 2016 edition of Publication 14. Mr. Flocken agreed to make the changes and email the revised document to the members for a review and explained that there is a November 1st deadline to submit the document or there will be an additional one year delay getting it published.

7. Review results of the NTEP / MC Mutual Recognition Agreement discussion at the 2015 NCWM Annual meeting

Discussion: Mr. Jim Truex (NTEP Administrator) was present and opened this discussion. Mr. Truex provided background information on how the NTEP Committee reached their recommendation during the NCWM Annual Meeting in July.

At the conclusion of his comments Mr. Truex left the meeting and the members continued their discussion on this matter. Refer to Items 7.a and 7.b for the specifics of the discussion.

a. Recommendation for the MC Checklist to be primary evaluation document

Discussion: During their May 2015 meeting the WG recommended to the NCWM Board of Directors that the MC checklist not be the primary document for the evaluation of MDMDs and that each country adopt its own checklist.

As reported by Mr. Truex, the NCWM NTEP Committee accepted this recommendation and recommended that the WG continue updating the current evaluation checklist in NCWM, Publication 14. Refer to Item 6 of this meeting summary for the current status of the checklist update.

b. Recommendation for MC to be primary evaluation laboratory

Discussion: At the suggestion of Mr. Jim Truex (NTEP Administrator), the WG revisited this item to consider its current position.

The members of the Work Group again voiced their concern regarding the impact of this recommendation on the current work load of the Ohio NTEP Laboratory, the potential loss of expertise in MDMD evaluations, and the time it takes to obtain the a certificate through the MC lab due to a backlog of evaluations and custom issues. Mr. Pascal Turgeon (MC) commented on the items by reporting that MC will send the test data to NTEP within a few days of the completion of the actual evaluation. This will allow NTEP to issue an NTEP CC while the test data is also being reviewed and processed by MC personnel. Mr. Turgeon also commented that it is clear that at some time in the future, the exclusiveness of the MC Laboratory could be removed. He also reminded everyone that the device type (i.e., MDMDs) could be removed from the MRA at any time.

The WG continued the discussion and agreed to revise its current position. The revised recommendation/position of the WG is provided below. Once the revised position was drafted and reviewed by all members, the chairman asked if any member disagrees; the Ohio NTEP Laboratory voiced their disagreement. No other objection was heard and the recommendation was made to forward the revised position to the NCWM NTEP Committee. A copy of the recommendation was sent to Mr. Truex on September 23rd so that it could be presented at the NCWM Board of Directors Fall Meeting the following week.

Recommendation:

The WG agrees to adding MDMD devices to the MRA and assign MC as the primary evaluation laboratory providing:

- 1. Separate evaluation checklists are used and maintained by NTEP and MC Laboratories.*
- 2. A specification comparison document is maintained which identifies differences in specifications that require separate testing.*
- 3. A commitment of the NTEP and MC labs to work together to reach a position where test data can be shared in both directions, eliminating the need for there to be a primary laboratory, thus supporting the existing wording in Section 4 of the current MRA. For example:*
 - a. Test Standards and Equipment*
 - b. Checklist Specific Training (Knowledge of country specific requirements.)*
 - c. A goal of reaching this objective by the 2021 renewal of the MRA.*
- 4. A request that NTEP and MC review internal processes with the goal of a quick turnaround of test results and reducing the overall time between application and certificate issuance.*

5. Report on progress from multi-interval operation requirements subgroup

Discussion: The members of the WG heard from Mr. Richard Harshman (NIST OWM) that an NCWM Form 15 proposal was submitted to the NCWM on behalf of the WG for consideration by the four regional weights measures associations during their fall 2015 meetings. The proposal, drafted as agreed by the WG at their May 2015 meeting, recommends changes to the HB 44 MDMD Code to address the use of multi-intervals in two or more partial measuring ranges within the same axis of an MDMD. Mr. Harshman noted that the proposal was submitted in time that all four regional associations should consider it during their fall 2015 meetings and with the recommendation that it be a voting item.

6. Develop Form 15's identified in Requirements Comparison Document

Discussion: The WG developed an NCWM Form 15 proposal for submittal to the NCWM for consideration by the regional weights and measures associations during their fall 2015 meetings. The proposal recommends a change to the MDMD Code of HB44 to include the requirement that all axes have the same unit of measure.

NEW ITEMS

Two new items were introduced during the meeting.

1. Mr. Kennington (WG Chair) led a discussion on whether or not the WG should request to be reassigned as an NTEP Sector. Mr. Flocken explained that the only difference between a WG and a Sector is that for a Sector the travel expenses for one evaluator from each authorized laboratory are paid for by NTEP. However, since the Ohio Laboratory is the only NTEP authorized laboratory to perform evaluations on MDMD devices and all recent WG Meeting have been held at the Ohio Laboratory, there is no increased benefit of becoming an NTEP Sector. Mr. Kennington recommended that the group not request reassignment and remain as a Work Group.
2. A proposal was presented to allow additional locations for some MDMD marking requirements. This request is due to smaller sized devices. The members agreed, an NCWM Form 15 was developed by the WG and will be submitted to the NCWM for consideration by the various regional weights and measures associations when they meet in the fall 2015.
2. A suggestion was made that a letter stating the WG's position on the addition of the MDMD devices to the US/Canada MRA be drafted by Mr. Kennington and distributed to the WG via email by December 1, 2015. A conference call is scheduled in December 2015 to review the contents of the letter and determine if the letter is to come from the WG representing all member companies or to be submitted by each member company individually. The letter will be

addressed to the members of the NTEP Committee. In addition, during the call the members will coordinate attendance to the January 2016 NCWM Interim Meeting to show support for the WG position. The WG discussed the possibility of asking the SMA to develop a statement supporting the position. Russ Vires (Mettler Toledo) mentioned that he would be attending the SMA's November meeting and would make this suggestion. Based on Mr. Vires comment, the WG decided to not make a formal request to the SMA.

CLOSING DISCUSSION

7. Review meeting activities and conclusions

8. Define next steps (if needed)

9. Next meeting

Members of the WG discussed meeting frequency and agreed that due to the MRA activity, they would meet again in approximately six months, on April 26 – 27, 2016 at the Ohio NTEP Laboratory. It is felt that at the conclusion of the April 2016 meeting, the meeting frequency would be changed to an annual time frame.

Multiple Dimension Measuring Device Work Group
April 26-27, 2016 - Reynoldsburg, Ohio
Meeting Summary

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i. Introductions and Welcome (<i>R. Kennington</i>).....	Error! Bookmark not defined.
ii. Reiteration of NTEP MDMD Work Group Mission (<i>D. Flocken</i>).....	Error! Bookmark not defined.
iii. Goal of this Meeting (<i>D. Flocken</i>).....	Error! Bookmark not defined.
iv. Report – 2016 NCWM Interim Meeting (<i>D. Flocken</i>).....	Error! Bookmark not defined.
v. Report – Recent Measurement Canada Type Evaluation Activity (<i>I. Tremblay / P. Turgeon</i>)	Error! Bookmark not defined.
vi. Report – Recent NTEP MDMD Type Evaluation Activity (<i>D. Flocken / T. Buck</i>).....	Error! Bookmark not defined.
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9. Develop Form 15's identified in Requirements Comparison Document	4
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10. The impact of MDMD Specifications and tolerances on the LTL trucking business and their use of such devices.....	4
11. Discussion on OIML Testing Capability	4
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Glossary of Acronyms and Terms

Acronym	Term	Acronym	Term
NIST	National Institute of Standards and Technology	NTEP	National Type Evaluation Program
MDMD	Multiple Dimension Measuring Device	OIML	International Organization of Legal Metrology
MC	Measurement Canada	OWM	Office of Weights and Measures
MRA	Mutual Recognition Arrangement	R	Recommendation
NCWM	National Conference on Weights and Measures	WG	Work Group

i. Introduction and Welcome (*R. Kennington*)

ii. Reiteration of NTEP MDMD Work Group Mission (*D. Flocken*)

Discussion: Darrell Flocken (NTEP) reviewed the mission of the MDMD WG as stated during the October 2014 and May 2015 WG meeting for the benefit of all participants. The mission of the WG is to deal with specific issues concerning MDMDs; i.e., to consider the requirements in NIST Handbook 44 (HB44) and make sure NTEP has a type evaluation checklist in place to verify compliance with HB44 and influence factor testing.

iii. Goal of this Meeting (*D. Flocken*)

Discussion: The goal for this meeting is to review and update both the MC / NTEP Specification Comparisons document and the NCWM Publication 14 Checklist. In addition, the WG should take this opportunity to discuss any new items brought to the WG's attention.

iv. Report – 2016 NCWM Interim Meeting (*D. Flocken*)

Discussion: Darrell Flocken reported that all 3 proposals submitted from the WG's September 2015 meeting were on the NCWM Specifications and Tolerance Committee agenda for this meeting. Darrell reported that there was a suggestion heard during the open hearings on the proposal permitting some required marks to be available on a separate document if the device is too small to accommodate them. While the comments were not in opposition to the proposal, a suggestion was made that consideration be given to requiring that the serial number of the device also be included on the accompanying document. It was mentioned that this requirement was already in place for load cells. As no strong opposition to the 3 proposals were heard during the open hearings, the Specifications and Tolerance Committee recommended that all 3 proposal remain as presented and be given voting status for the July 2016 NCWM Annual Meeting.

v. Report – Recent Measurement Canada Type Evaluation Activity (*P. Turgeon*)

Discussion: Pascal Turgeon report that there has been no type evaluation activity since the September 2015 WG Meeting. Pascal did take the opportunity to report that several changes in personnel have occurred in the Measurement Canada Laboratory. Isabelle Trembley and Justin Rea have both moved to other positions within Measurement Canada.

vi. Report - Recent NTEP MDMD Type Evaluation Activity (*T. Buck*)

Discussion: Tom Buck reported that the Ohio NTEP Laboratory had received 7 evaluation assignments; 4 assignments were for new devices and 3 assignments were for revisions to existing certificates.

1. Review meeting summary from September 2015 meeting

Discussion: Chairman Kennington asked if there were any changes or additions to the September 2016 Meeting Summary, hearing now he asked for the adoption of the summary. The meeting summary was adopted by unanimous vote.

2. Review changes to NIST, Handbook 44, MDMD code since last meeting

Discussion: No changes to Handbook 44 have been made since the WG's September 2015 meeting. It was reported that the 3 proposals submitted from the September 2015 WG Meeting were on the National S&T's Committee Report with a voting status for the up coming July 2016, NCWM Annual Meeting.

3. Review changes to NCWM, Publication 14, MDMD Checklist

Discussion: D. Flocken reported that there has no changes to the Checklist reviewed and adopted by the WG during their September 2015 Meeting. He also reported that the Checklist was adopted by the NTEP Committee and is published in the 2016 edition of Publication 14.

4. Review changes to Measurement Canada MDMD Code and Terms and Conditions

Discussion: P. Turgeon reported that no changes to the Canadian MDMD Code have occurred since the WG's September 2015 meeting.

5. Review update to NTEP / MC Requirements Comparison Document

Discussion: D. Flocken reported on the current status of the WG's Comparison Document. No changes have been made to the document since the WG's September 2015 Meeting.

6. Publication 14, MDMD Checklist

Discussion: It was agreed that no changes to the Checklist are required at this time. The WG will review possible changes during their next meeting.

7. Review results of the NTEP/MC Mutual Recognition Agreement discussion at the 2016 NCWM Interim meeting

Discussion: D. Flocken reported that at the request of Measurement Canada, the proposal of adding MDMD devices to the NTEP / Measurement Canada Mutual Recognition Agreement document be withdrawn. The request was made based on comments heard during the NCWM, 2016 Interim Meeting. MC felt that there was not enough support for the addition. The NCWM, NTEP Committee removed the item from their agenda and suggested that if necessary, members of industry can reintroduce the proposal at a later date.

8. Report on progress from multi-interval operation requirements subgroup

Discussion: : Mr. Rick Harshman (OWM) provided an update on the progress of three NCWM Form 15 proposals that had been submitted by the MDMD Work Group to the NCWM in 2015, one of which, was developed by a small subgroup of the MDMD WG formed to address multi-interval MDMDs. Mr. Harshman reviewed the intended purpose of each proposal and noted that each had been submitted to the four regional weights and measures associations early enough in 2015 to be considered by each of those regions when they met for their fall meeting. Having been accepted by at least one region, the proposals were then added to the 2016 S&T Committee's agenda and given consideration at the 2016 NCWM Interim Meeting. The proposals appear on the 2016 S&T Committee's Agenda as Agenda Items 358-1, 358-2, and 358-3. The Committee received a number of comments in favor of the proposals at

the Interim Meeting, which prompted the Committee to assign a voting status to each proposal. Each proposal will be voted on at the upcoming 2016 NCWM Annual Meeting in July.

Mr. Harshman noted that OWM's Legal Metrology Devices Program had earlier expressed concern in comments to the S&T Committee regarding the proposal (i.e., the Item 358-2 proposal) to allow some marking information to appear on an accompanying document rather than be marked on the device as is currently required by the MDMD Code in HB 44. OWM's concern was that the proposal didn't require the serial number of the device to appear on the accompanying document to link the two together, as is required on accompanying documents for load cells in the Scales Code of HB 44. Mr. Harshman also questioned how officials performing a test on an MDMD could immediately tell the value of the measuring division for each axis and range and the minimum and maximum dimensions for each axis if this information doesn't appear on the device. He further noted that officials need this information to determine tolerances and to ensure that tests are within the operational parameters set by the manufacturer.

With respect to S&T Item 358-2, Mr. Scott Henry (Zebra Technologies) noted that the information proposed for inclusion on the accompanying document can be accessed from a menu on the devices offered by Zebra Technologies and that instructions for accessing the information could be made available on the NTEP CC. It was also reported that the value of the measuring division for each axis and range on equipment in which this proposal was intended to apply is fixed and not configurable.

9. Develop Form 15's identified in Requirements Comparison Document

Discussion: The WG reviewed the remaining "open" items and agreed that 2 changes to Handbook 44 would have value. The items were:

1. The expansion of S.1.7. to include multi-interval devices with the additional proposed changes provides a better explanation of how to apply the 12 d minimum measurement specification and the application of tare with respect to marked maximum dimension for the axes in which tare was applied, and
2. the change in the use of the word "length" to "measurement".

A Form 15 was developed during the WG meeting and was submitted to the NCWM the following week. A copy of the submitted document is included at the end of this summary document.

10. The impact of MDMD Specifications and tolerances on the LTL trucking business and their use of such devices

Discussion: Mr. Don Newell presented an overview of the LTL (Less Than Truckload) trucking business. A copy of Mr. Newell's presentation is included in the distribution of this meeting summary and is available on the meeting archive.

Mr Newell spoke of some of the challenges that LTL trucking companies face when assessing freight charges. Many of the pallets are not uniform, and can be difficult to measure. Some are too large to be moved around with a fork lift. Traditional methods of charging by commodity code can have its own challenges. He asked manufacturers of MDMD equipment to consider these realities, as they design pallet MDMD's.

Density is one of four factors used by some LTL trucking companies to establish freight class. It is the number one component in determining freight charges. The other three factors are stow-ability, handling, and liability. Density is a ratio of the weight of a product to be shipped divided by its volume in cubic feet (i.e., lb/ft³). Generally speaking, the higher the density, the lower the price to ship.

11. Discussion on OIML Testing Capability

Source: H. Sprague Ackley, Honeywell

Background/Discussion: In previous meetings the Measurement Canada and Ohio Laboratory's have indicated that they are looking into what it would take to be able to perform an OIML certification Mr. Ackley offered to lead a discussion to see whether there is something that the MDMD Work Group could do to support this direction.

12. Review meeting activities and conclusions

Nothing to report

13. Define next steps (if needed)

Discussion: The WG agreed that no specific actions are needed from this meeting. The WG will monitor the 3 existing and 1 new proposal and will address their outcome at the next meeting.

14. Chairman's discussion

Discussion: Chairman Kennington took this opportunity to comment that he has chaired the WG for close to 10 years and expressed interest in resigning from the position. He opened the discussion to others who would be interested in moving into the chair position. No one openly volunteered and the discussion was closed. D. Flocken and R. Harshman both commented that the WG needs to become more self operating in that the members should consider appointing document responsibility to WG members.

15. Next meeting

Discussion: While the last 4 meeting were held on a semi-annual basis the WG agreed that our assigned tasks have been completed and the meeting schedule could return to an annual basis. The WG agreed to have the next meeting on Tuesday and Wednesday, May 2-3, 2017. Once again the Ohio NTEP Laboratory agreed to host the meeting at their location.

**Multiple Dimension Measuring Device Work Group
(2nd Day - Combined meeting with Software Sector)
May 2-3, 2017 - Columbus, Ohio
Meeting Summary – Final**

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Glossary of Acronyms and Terms

Acronym	Term	Acronym	Term
NIST	National Institute of Standards and Technology	NTEP	National Type Evaluation Program
MDMD	Multiple Dimension Measuring Device	OIML	International Organization of Legal Metrology
MC	Measurement Canada	OWM	Office of Weights and Measures
MRA	Mutual Recognition Arrangement	R	Recommendation
NCWM	National Conference on Weights and Measures	WG	Work Group

i. Introduction and Welcome

ii. Reiteration of NTEP MDMD Work Group Mission

Discussion: Mr. Darrell Flocken (NTEP) reviewed the mission of the WG which is to deal with specific issues concerning MDMDs related to the requirements in NIST Handbook 44, NTEP type evaluation checklist, and maintaining the NTEP/MC Requirements Comparison Document.

iii. Goal of this Meeting

Discussion: The goal for this meeting was to review and update both the MC / NTEP Specification Comparisons document and the NCWM Publication 14 Checklist. In addition, the WG also discussed several new proposals for possible changes to NIST Handbook 44 and/or NCWM Publication 14.

iv. Report – 2016 NCWM Interim Meeting

Discussion: Mr. Rick Harshman (OWM) reported that all three proposals submitted from the WG's September 2015 meeting were adopted during the NCWM's Annual Meeting in July 2016. Mr. Darrell Flocken (NTEP) reported that there are two proposals on this year's Specification and Tolerance Committee agenda. The first proposal (S&T Agenda Item 3508-1) was submitted by the MDMD Work Group and has a status of "voting" going into the July 2017 meeting. The second proposal (3508-2) was submitted by Mr. Ross Andersen (NY retired) and the S&T Committee recommended this item be withdrawn.

v. Report – Recent Measurement Canada Type Evaluation Activity

Discussion: Ms. Paige Vinten (MC) reported that in 2016, MC conducted type evaluations on two devices, one of which passed and the other failed. In the current year (2017) there are five applications pending; two of which are for new devices, and the remaining three for revisions of existing Notice of Approvals (NoAs).

vi. Report - Recent NTEP MDMD Type Evaluation Activity

Discussion: Mr. Tom Buck (OH) reported that the Ohio NTEP Laboratory had received 14 evaluation assignments since last year's meeting; 7 assignments were for new devices and 7 assignments were for revisions to existing certificates. Of

these 14 applications, Mr. Buck reported that 6 were dynamic operation, 5 were static devices, and 3 were handheld devices.

1. Review meeting summary from April 2016 meeting

Discussion: Chairman Mr. Robert Kennington (Quantronix, Inc.) asked if there were any changes or additions to the September 2016 MDMD Meeting Summary. Hearing none, he asked for the adoption of the summary. It was adopted by unanimous vote.

2. Review changes to NIST, Handbook 44, MDMD code since last meeting

Discussion: Mr. Rick Harshman (OWM) reported that the three proposals submitted to the NCWM S&T Committee by the MDMD WG in 2015 were adopted at the 2016 NCWM Annual Meeting and resulted in changes being made to the 2017 version of NIST Handbook 44 MDMD Code. Mr. Harshman reviewed the adopted proposals with members of the WG. A brief description of the three proposals is as follows: (See the S&T Committee's 2016 Final Report for more details concerning these items.)

1. S&T Agenda Item 358-1: Create a new specification in the Multiple Dimensioning Measuring Device Code to require that the measurement result of all axes being displayed, printed or recorded, in the same unit of measure.
2. S&T Agenda Item 358-2: Incorporate the ability to permit some required marking information to be accessible via the display providing instructions for displaying the information is specified on the NTEP CC.
3. S&T Agenda Item 358-3: Provide requirements pertaining to the use of multi-intervals on an MDMD.

Mr. Darrell Flocken (NTEP) noted that there are two MDMD proposals on the S&T Committee's 2017 agenda. They are:

S&T Agenda Item 3508-1: This item originated from the MDMD Work Group. The proposal recommends three changes:

1. identified that when a device is operating in a multiple range mode, the 12 d minimum only applies to the first range.
2. replacing the work 'length' with 'measurements' in paragraphs S.1.7. and S.1.8.
3. Adding a tare value, if used, in the measurement to determine if the measurement exceeds capacity plus 9 d.

This item was recommended as a voting item at the upcoming NCWM Annual Meeting to be held July 2017.

S&T Agenda Item 3508-2: This item proposed adding wording to paragraph T.3. Tolerance Values which would clarify that a tolerance value shall be applied in both an underregistration and overregistration from the displayed or recorded value. The S&T Committee recommended that this proposal be withdrawn.

3. Review changes to NCWM, Publication 14, MDMD Checklist

Discussion: Mr. Darrell Flocken (NTEP) reported that there have been no changes to the Checklist since the last WG Meeting.

4. Review changes to Measurement Canada MDMD Code, and Terms and Conditions Documents

Discussion: Mr. Pascal Turgeon (MC) reported that recent changes to the MC Terms and Conditions document has created the need to update the paragraph references in the NTEP/MC Requirements Comparison document. Mr. Turgeon mentioned that the changes to the Terms and Conditions document are not yet complete; however, when they are, he will develop recommended changes to the comparison document. These changes will be presented at the 2018 MDMD WG meeting.

5. Review OIML Activity Related to R129 CD2

Discussion: Mr. Pascal Turgeon (MC) reported that the R129 OIML WG (TC5 SC2) distributed the 2nd committee draft (2CD) and has ask participating countries for an acceptance vote. Mr. Turgeon reported that he is aware of several countries that have provided additional comments and therefore believes there will be a 3rd committee draft developed and made available later this year.

Several members of the MDMD WG requested copies of the comments submitted by Canada and the USA. A copy of these documents will be provided under separate cover.

6. Review update to NTEP / MC Requirements Comparison Document

Discussion: No updates to the document were made during this meeting. See the comment in Item 4 of this Summary for future changes to the document.

7. Publication 14, MDMD Checklist

Discussion: No changes were presented at this meeting. However, WG members agreed to form a small sub-work group to review and develop changes to NCWM Publication 14, if necessary, based on the adoption of the three proposals at the July 2016 NCWM Annual Meeting. Refer to Item 2 of this summary Report for more details on the three adopted proposals.

8. Report on progress from multi-interval operation requirements subgroup

Discussion: Subgroup chair, Mr. Rick Harshman (OWM) reported that the subgroup completed its assigned task and there being no additional assignments provided by the MDMD WG, the subgroup has disbanded. Mr. Harshman reminded members of the WG that the changes made to the MDMD Code in NIST Handbook 44 (HB 44) in 2017 due to the adoption of the proposals submitted by the WG in 2016, needed to be reviewed to determine if changes are now needed to NCWM Publication 14. Mr. Darrell Flocken (NTEP) agreed to chair a small subgroup to review the HB 44 MDMD Code requirements that were adopted and develop suggested changes to NCWM Publication 14. It was agreed that the suggested changes will be presented at the next MDMD WG meeting.

Members of the subgroup are:

Mr. Sprague Ackley, Honeywell	Mr. Tony Romeo, Datalogic USA, Inc.
Mr. Tom Buck, Ohio Dept. of Agriculture, NTEP Laboratory	Mr. Dick Suiter, Richard Suiter Consulting
Mr. Scott Davidson, Mettler-Toledo, LLC	Mr. Pascal Turgeon, MC
Mr. Darrell Flocken, NTEP (Chair)	Mr. Scott Wigginton, United Parcel Services

Mr. Flocken agreed to create some beginning documents and distribute to the subgroup members followed by scheduling a conference call.

9. Proposal to revise paragraph 3.5. of the Publication 15 Checklist for Multiple Dimensions Measuring Devices

Discussion: Mr. Scott Henry (Zebra Technologies) proposed changing paragraph 3.5 of the MDMD Checklist of 2017 edition of NCWM Publication 14. The justification for this recommendation is that a “Live Display” is not required for Multiple Dimensioning Measuring Devices while in the measuring mode.

3.5. If an indicator or a video display terminal gives the only indication for the dimensioning system, when in measuring mode, the ~~dimension, volume, and~~ weight values, if applicable, must be live and displayed

continuously. The displayed values must be located in an area dedicated, clearly distinguished and separated from the other information on the display. (If the video display is an addition to another primary display the operator's display need not be a "Live" display, but the values displayed must be in a dedicated area and separated from the other information on the display.)

The WG discussed this item and agreed that a live display is not required and in some cases, not possible on measuring devices. While supporting the intent of the proposed change, the discussion lead to the idea that the problem was not the fact that dimension and volume values were included in this requirement, but that the requirements defines these values as being live values. The WG reviewed NIST Handbook 44 (HB 44) and the MC requirements and found no requirement for a "Live Value." In addition, a quick review of the current wording found that this paragraph was originally borrowed from NCWM Publication 14, DES paragraph 11.6. and modified to fit the MDMD Checklist. Based on this and additional discussions, the WG suggested the following change to the paragraph:

- 3.5. If an indicator or a ~~video~~ display ~~terminal~~ gives the only indication for the dimensioning system, when in measuring mode, the dimension, volume, and weight values, if applicable, must be ~~live and~~ displayed and readable continuously. The displayed values must be located in an area dedicated, clearly distinguished and separated from the other information on the display. ~~(If the video display is an addition to another primary display the operator's display need not be a "Live" display, but the values displayed must be in a dedicated area and separated from the other information on the display.)~~

The WG members agreed that this change is in alignment with the intent of the original proposal and agreed to recommend that this change be made in the MDMD Checklist in the 2018 edition of Pub 14.

10. Proposal to Remove Paragraph S.1.5.2. of HB44 and Paragraph 7.5. of Pub 14

Discussion: Mr. Scott Henry (Zebra Technologies) proposed removing paragraph 7.5. in the MDMD Checklist of NCWM Publication 14 and submitting a proposal to the NCWM S&T Committee to remove paragraph S.1.5.2. of NIST Handbook 44 (HB 44) MDMD Code, as shown below. His justification for removing paragraph S.1.5.2. was that the requirement does not allow for multi-interval devices (i.e., devices with two or more partial measuring ranges (or segments) specified for any of the "dimensioning" axes (length (x), width (y), or height (z)) and the division values corresponding to those partial measuring ranges (or segments) within the same "dimensioning" axis differ) to be used to measure Irregular shaped objects. Multi-interval devices will determine the smallest hexahedron for an irregular shaped object. No need to restrict the L & W axis to the same (d) value.

NIST Handbook 44 recommendation:

~~S.1.5.2. Devices Capable of Measuring Irregularly Shaped Objects. — For devices capable of measuring irregularly shaped objects, the value of the division size (d) shall be the same for the length axis (x) and the width axis (y) and may be different for the height axis (z), provided that electronic rotation of the object to determine the smallest hexahedron is calculated in only a two dimension horizontal plane, retaining the stable side plane as the bottom of the hexahedron.
(Added 2008)~~

NCWM Publication 14 Recommendation:

~~Code Reference: S.1.5.2.~~

~~7.5. The devices capable of measuring irregular shaped object, the value of division size (d) shall be the same for the length axis (x) and the width and the width axis (y) and may be different for the height axis (z), provided that electronic rotation of the object to determine the smallest hexahedron is calculated in only a two dimension horizontal plane, retaining the stable side plane as the bottom of the hexahedron~~

The WG reviewed this proposal and member consensus was to oppose the recommended changes. Several members stated that this information was needed for devices that develop measurements based on a two-sided horizontal plane. In this type of operation both the X, and Y axis must have the same “d” value because of possible object rotation. When the object is rotated, components of both the X and Y axis are used to calculate the length and width. Allowing different “d” values, would introduce error into these calculations. When an object is positioned with its most stable side down and rotated 45°, the X and Y axis change places, which could also lead to incorrect length and width calculations. As a result of these discussions, the submitter agreed to withdraw the proposal.

11. Rounding of a calculation from a volume measurement in one unit of measure to a higher unit of measure

During a recent discussion with MC, a question was raised regarding the rounding of a volume measurement in one unit of measure to a higher unit of measure. The example given was if a measuring device measured the X, Y, and Z axes in cm and the measurements was converted to cubic centimeters and then converted to cubic meters. Could the rounding from cubic centimeters to cubic meters effect the measurement enough where the charge based on the measurement could be different.

For example: $123 \text{ cm} \times 321 \text{ cm} \times 12 \text{ cm} = 473\,796 \text{ cm}^3 = 0.473\,796 \text{ m}^3$. Both values would calculate the same charges, however one might be more inclined to round off small decimal places but not whole numbers. Where you probably wouldn't round off the cm^3 because it is a whole number, one might round m^3 off to 0.47 because small decimal values are messy/appear way more accurate than they need.

Discussion: The WG members discussed this item and felt that developing a requirement for this was beyond the scope of this WG and suggested that the result of the calculation follow the rules of “Significant Figures.” Based on these rules, the answer could be limited to 3 digits (473 cm^3 or 0.47 m^3) as any additional numbers have no real impact on the result. One WG member pointed out that in most cases the device does not calculate a volume value so rounding of volume calculations is the responsibility of the user.

12. Outcome of joint meeting with the Software Sector

Discussion: Software Sector Chair Mr. Jim Pettinato (TechnipFMC plc) explained the idea of software separation into metrological and non-metrological sections and mentioned that this concept was discussed at other Sector meetings. The Weighing Sector agreed to place a paragraph into the Checklist of the Digital Electronic Scales portion of NCWM Publication 14. The wording agreed to is as follows:

The manufacturer must describe and possibly demonstrate how the version or revision identifier is directly and inseparably linked to the metrologically significant software. Where the version revision identifier is comprised of more than one part, the manufacturer shall describe which portion represents the metrological significant software and which does not. Yes ___ No ___ N/A ___

Note: Manufacturers may choose to separate metrologically significant software from non-metrologically significant software. Separation would allow the revision of the non-metrological portion without the need for further evaluation. In addition, non-metrologically significant software may be updated on devices without breaking a seal, if so designed. Separation of software requires that all software modules (programs, subroutines, objects, etc.) that perform metrologically significant functions or that contain metrologically significant data domains form the metrologically significant software part of a measuring instrument (device or sub-assembly). If the separation of the software is not possible or needed, then the software is metrologically significant as a whole.

Members of the MDMD WG agreed to add this same text to the MDMD Checklist in the 2018 edition of NCWM Publication 14 with an additional sentence added specifying that these requirements are voluntary until 2022. Mr. Darrell Flocken (NTEP) was granted editorial rights by the WG for determining the appropriate location in the MDMD Checklist to insert the new text.

13. Review meeting activities and conclusions

Nothing to report

14. Define next steps (if needed)

Discussion: The assigned action items from this meeting was the creation of a new subgroup tasked with developing proposed changes to the MDMD Checklist in NCWM Publication 14 based on the three WG proposals that were adopted by the NCWM in 2016, which resulted in changes being made to the MDMD Code of NIST Handbook 44 (HB 44) in 2017. It was also agreed that the new subgroup would develop proposed changes to the MDMD Checklist in consideration of the WG's current proposal that will likely be adopted by the NCWM at its Annual Meeting in July 2017.

A WG member asked at what point can the Provisional ("P") status of both new and existing NTEP Certificates of Conformance (CCs) be stopped? Mr. Jim Truex (NTEP Administrator) informed the WG that it is the responsibility of the WG to suggest to NTEP when to remove the Provisional status. This recommendation should come only after the WG agrees that the specification and performance requirements in Handbook 44 and the Checklist in NCWM Publication 14 are in a mature (fully developed) and working condition. Mr. Truex also reviewed the actions NTEP will take on existing CCs once the Provisional status is removed. WG members agreed to hold off on the recommendation until the next MDMD WG meeting, giving manufacturers ample time to evaluate the impact on their existing certificates.

15. Chairman's discussion

Discussion: MDMD WG Chairman Mr. Robert Kennington (Quantronix, Inc.) took this opportunity to comment that he has chaired the WG for close to 10 years and expressed interest in resigning from the position. He opened the discussion to others who would be interested in moving into the chair position. No one openly volunteered and the discussion was closed.

16. Next meeting

Discussion: The WG agreed to have the next meeting on Tuesday and Wednesday, May 9th & 10th, 2018. The meeting location will be determined later.

Multiple Dimension Measuring Device Work Group
May 8-9, 2018
Meeting Summary

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Glossary of Acronyms and Terms

Acronym	Term	Acronym	Term
NIST	National Institute of Standards and Technology	NTEP	National Type Evaluation Program
MDMD	Multiple Dimension Measuring Device	OIML	International Organization of Legal Metrology
MC	Measurement Canada	OWM	Office of Weights and Measures
MRA	Mutual Recognition Arrangement	R	Recommendation
NCWM	National Conference on Weights and Measures	WG	Work Group

Introduction and Welcome

i. Introductions and Welcome

Mr. Robert Kennington, (Quantronix, Inc. and WG Chair) welcomed everyone to the 2018 Work Group (WG) Meeting. Introductions were made around the room and the meeting was called to order.

ii. Reiteration of NTEP MDMD Work Group Mission

Discussion: Mr. Darrell Flocken (NTEP) reviewed the mission of the WG which is to deal with specific issues concerning MDMDs related to the requirements in NIST Handbook 44, NTEP type evaluation checklist in Publication 14, and maintaining the NTEP/MC Requirements Comparison Document.

iii. Report – 2018 NCWM Interim Meeting

During the January 2018 NCWM⁷ Interim Meeting, the following proposal was given a Developing status. Members of this Work Group should track the activity of this proposal.

S.1.11. Provision for Sealing. - For devices and systems in which the configuration or calibration parameters can be changed by use of a removable digital storage device, security shall be provided for those parameters as specified in G-S.8.2. For parameters adjusted using other means, the following applies:

- (a) **A The device or system** shall be designed with provision(s) for applying a security seal that must be broken, or for using other approved means of providing security (e.g., data change audit trail available at the time of inspection), before any change that detrimentally affects the metrological integrity ~~of the device~~ can be made to any measuring element.

Discussion: Mr. Richard Harshman (NIST-OWM) presented background information on this proposal. Note: this proposal accompanies a recommendation to adopt a new paragraph in the General Code. This proposed paragraph is G-S.8.2.; please refer to Appendix A, of this Summary Report, for more information on this item. Additional information on this item is also available in *NCWM Publication 16*, Specifications and Tolerances (S&T) Committee 2018 Interim Meeting Report currently available using the following link: <http://www.ncwm.net/meetings/annual/publication-16>

iv. **Report – Recent Measurement Canada Type Evaluation Activity**

Discussion: Mr. Pascal Turgeon (Measurement Canada) reported the following evaluation activity occurred since the May 2017 WG Meeting.

- 7 assignments were received having 3 for palletized freight static systems, 2 static system, and 2 for dynamic systems.

Mr. Turgeon informed the WG members that there is no current backlog for evaluation.

v. **Report – Recent NTEP MDMD Type Evaluation Activity**

Discussion: Mr. Tom Buck (Ohio, NTEP Laboratory) reported the following evaluation activity occurred since the May 2017 WG Meeting.

- 12 assignments were received having 5 for static systems, 3 for dynamic systems, 3 in-motion, drive thru systems, and 1 handheld system.
- The evaluations were received from 6 manufacturers and resulted in the issuing of 8 new and 4 amended CCs.

Carry Over Items

1. Review meeting summary from May 2017 meeting

A copy of the May 2017 Meeting Summary can be downloaded at www.ncwm.net/ntep/sectors/mdmd/archive. Please bring a copy of the summary with you to the meeting.

Discussion: Mr. Robert Kennington asked if there were any comments, corrections, or changes for the meeting minutes from the 2017 WG Meeting.

Mr. Kennington commented that it was agreed to during the 2017 meeting to add the statement to Publication 14, developed by the Software Sector (SS), regarding software separation. This statement could not be found in the 2018 edition of the publication. Mr. Flocken explained that the addition was withheld as the SS has asked the NTEP Committee for the creation of a separate checklist in Publication 14 dedicated to software issues. The outcome of the decision by the NTEP Committee, will determine if the additional will be added to the MDMD Checklist or become part of the software checklist.

Hearing no other comments, a call for approval of the minutes was made and a positive vote was received from all voting members of the WG.

2. Review changes to NIST, Handbook 44, MDMD code since last meeting

During the NCWM, Annual Meeting in July 2017, the following proposals were adopted into Handbook 44.

S.1.7. Minimum Measurement Lengths. – Except for entries of tare, the minimum measurement length to be measured by a device is 12 d divisions. The manufacturer may specify a longer minimum measurement length. For multi-interval devices, this applies only to the first measuring segment.

S.1.8. Indications Below Minimum and Above Maximum. – When objects are smaller than the minimum dimensions identified in paragraph S.1.7. Minimum Measurement Lengths or larger than any of the maximum dimensions plus 9 d, and/or maximum volume marked on the device plus 9 d, or when a combination of dimensions, including tare, for the object being measured exceeds the measurement capability of the device, the indicating or recording element shall either:

Discussion: Mr. Darrell Flocken reviewed the proposal, shown above, that was voted on during the July 2017 NCWM Annual Meeting. The proposal was adopted and the changes were incorporated into the 2018 edition of NIST Handbook 44.

3. Review changes to NCWM, Publication 14, MDMD Checklist

The following change, as agreed to during the May 2017 MDMD Work Group meeting, was made to the MDMD Checklist in the 2018 edition of Publication 14:

Removed reference to a requirement involving a “live” display in sentence 3.5.

No other changes were made.

Discussion: Mr. Darrell Flocken (NCWM NTEP Specialist) reviewed the single change made to the 2018 edition of Publication 14. Refer to the 2017, MDMD WG Meeting Summary for more details on this change.

4. Review changes to Measurement Canada MDMD Code, and Terms and Conditions Documents

Discussion, as needed, regarding any changes to the Canadian MDMD Code since the Work Group’s May 2017 meeting.

- 4.1. MC's decision to allow Cubetape PRO and Cubetape POS from Parcel Tools to be used in trade without being approved;
- 4.2. MC's decision on printed information required when requested by the Customer; and
- 4.3. Status on external consultation on MDMD Terms and Conditions.

Discussion: Beyond changes to Canadian MDMD terms and Conditions, Mr. Pascal Turgeon (MC) wanted to inform the group on 3 other topics related to MDMDs:

- 4.1. Mr. Turgeon distributed a letter informing each member of the group that Cubetape PRO and Cubetape POS, manufactured by Parcel Tools, when used with a tape that displays measurement values (numbers) and barcodes, are to be considered as Linear Static Measures and are exempt from approval, examination and certification (Weights and Measures Regulations, paragraph 4(1)(o)). Consequently, in Canada, these Linear Static Measures can be used in trade just like a regular tape measure would be. It was also mentioned to be careful because some very similar measuring tools, depending on how they operate, are not Linear Static Measures and are not exempt from approval and must be certified by Measurement Canada before using it in trade. It was reiterated that in case of doubt, contact Measurement Canada for clarification;
- 4.2. On a few occasions, it was brought to Pascal’s attention that some device owners did not provide complete information to customers. For this reason, Pascal wanted to clarify the requirement.

In section 3.0 of the current [*Terms and conditions for the approval of multiple dimension measuring device*](#), it states that when a customer is not present for the transaction, the trader must provide (in printed or in any other form (i.e. email)) to the customer, dimensions and/or volume, with units of measurement. What is meant by dimensions and/or volume is the values given by the MDMD. If your MDMD measures by 0.1 inch, then all measurements shall be by 0.1 in. For example, a box measuring 13.1 inches x 13.4 inches x 13.9 inches shall not be rounded to 13 inches x 13.5 inches x 14 inches. If the trader uses these values to provide a dimensional weight, it is acceptable but the customer must be able, within a period of 30 days, to get the original values given by the MDMD.
- 4.3. A new Terms and Conditions document is in the developing process. External consultation on the document is the next step and Pascal will keep the group inform when the document is ready for consultation.

Mr. Turgeon provided the following information to the manufacturers regarding changes in the evaluation process.

In the past, both in-motion and palletized freight devices have typically been regarded as being too large to test in the laboratory. A new policy is that all testing of these devices will be performed in the Measurement Canada laboratory.

For palletized freight this means that the device must be able to be installed in our high bay. It will require a self-supporting structure. These tests will be full sized tests of the device. In exchange for this, manufacturers can have the temperature tests done in the MC chamber. The chamber may require a scaled down version of the device. Manufacturers will continue to have the option of having the evaluation performed off-site; however, this will then require the temperature testing be done on a full-size device.

For in-motion devices the manufacturer can supply a portable belt which will be tested in the MC temperature chamber. In this situation, MC will allow some scaling of the device. However, for test conducted out side the temperature chamber (e.g. maximum belt speed and object size) scaling is not permitted.

5. Review OIML Activity Related to R129 CD2

Discussion, as needed, regarding activity of the OIML Committee responsible for revising the International Recommendation 129 for MDMD instruments

Discussion: Mr. Richard Harshman (NIST OWM) and Mr. Pascal Turgeon (MC) both reported that progress on the revision to OIML R 129 is slow; however, the 3rd Committee Draft document is expected for distribution to the OIML committee members in July 2018.

6. Review update to NTEP / MC Requirements Comparison Document

Source: Work Group

Status: The NTEP / Measurement Canada Requirements Comparison document is unchanged since the Work Group's September 2015 meeting. A copy of the document is available on the NCWM website in the MDMD Work Groups, Meeting Archives.

Recommendation: Review and determine if any NTEP or Measurement Canada changes to regulations or requirements impact the contents of this document.

Discussion: Mr. Pascal Turgeon reported that no change has occurred to the Measurement Canada regulations that would require a change to this document. Mr. Darrell Flocken reported that no change has occurred to NIST Handbook 44 or NCWM Publication 14 that would require a change to this document. Based on this information, a review of the document was postponed until the next WG meeting.

7. Publication 14, MDMD Checklist

7.1. At the May 2017 meeting, a work group was created to review and make any recommendations for changes to Publication 14 based on the adopted changes to Handbook 44 at the NCWM's, 2016 annual meeting. The work group was also charged with developing a recommendation for any changes to Publication 14 based on the adoption of a proposal for a change to Handbook 44, up for adoption during the NCWM's, 2017 annual meeting. Note: the proposed item was adopted during the NCWM's, 2017 annual meeting.

7.1.1.a. Item 1 - as adopted:

S.1.5. Value of Dimension /Volume Division Units. – The value of a device division “d” expressed in a unit of dimension shall be presented in a decimal format. The value of “d” for each measurement axis shall be in the same unit of measure and expressed as:

....

The subgroup reviewed the contents of Publication 14, 2017 edition and found the current wording.

3. Indicating and Recording Elements – General

....

Code Reference S.1.5.

....

3.10 Displayed and printed values of length, width, and height must be in the same unit of measure.

While this statement does not specifically mention the value of “d”, the requirement that all measurement values must be in the same unit of measure implies that “d” must satisfy this specification.

Recommendation:

The subgroup recommends modifying sentence 3.10 by adding examples of units of measures as shown below.

3.10 Displayed and printed values of length, width, and height must be in the same unit of measure (e.g. cm, in, etc).

Discussion: Mr. Darrell Flocken reviewed the changes to paragraph S.1.5. of the MDMD Code of NIST Handbook 44 that had been adopted at the 2016 NCWM Annual Meeting. In addition, he presented the recommendation from the MDMD subgroup to amend NCWM Publication 14 to align it with the HB 44 MDMD Code changes. The members of the WG agreed with the recommendation. Upon approval of the NTEP Committee, the adopted wording will be added into the 2019 edition of Publication.

7.1.1.b. Item 2 - as adopted:

Table S.4.1.a. Marking Requirements for Multiple Dimension Measuring System				
To Be Marked With	Multiple Dimension Measuring Equipment			
	Multiple Dimensions Measuring Device and Indicating Element in Same Housing	Indicating Element Not Permanently Attached to Multiple Dimension Measuring Element	Multiple Dimension Measuring Element Not Permanently Attached to the Indicating Element	Other Equipment (1)
Manufacturer's ID	X	X	X	X
Model Designation	X	X	X	X
Serial Number and Prefix	X	X	X	X (2)
Certificate of Conformance Number (8)	X	X	X	X (8)

Minimum and Maximum Dimensions for Each Axis (3)(9)	X	X	X	
Value of Measuring Division, d (for each axis and range) (9)	X	X	X	
Temperature Limits (4)(9)	X	X	X	
Minimum and Maximum Speed (5)(9)	X	X	X	
Special Application (6)(9)	X	X	X	
Limitation of Use (7)(9)	X	X	X	

(Amended 2016)

Table S.4.1.b. Multiple Dimension Measuring Systems Notes for Table S.4.a.	
<ol style="list-style-type: none"> 1. Necessary to the dimension and/or volume measuring system, but having no effect on the measuring value (e.g., auxiliary remote display, keyboard, etc.) 2. Modules without "intelligence" on a modular system (e.g., printer, keyboard module, etc.) are not required to have serial numbers. 3. The minimum and maximum dimensions and measuring division (using upper and lower case type) shall be marked. For example: Length: min ___ max ___ d___ Width: min ___ max ___ d___ Height: min ___ max ___ d___ 4. Required if the range is other than -10 °C to 40 °C (14 °F to 104 °F.) 5. Multiple dimension measuring devices, which require that the object or device be moved relative to one another, shall be marked with the minimum and maximum speeds at which the device is capable of making measurements that are within the applicable tolerances. 6. A device designed for a special application rather than general use shall be conspicuously marked with suitable words visible to the operator and the customer restricting its use to that application. 7. Materials, shapes, structures, combination of object dimensions, speed, spacing, minimum protrusion size, or object orientations that are inappropriate for the device or those that are appropriate. 8. Required only if a Certificate of Conformance has been issued for the equipment. 9. <u>This marking information may be readily accessible via the display. Instructions for displaying the information shall be described in the NTEP CC.</u> (Amended 2016) 	

The subgroup reviewed the contents of Publication 14, 2017 edition and found that Table S.4.1.a. contains much the same information as that appearing in Table S.4.1.a. of NIST Handbook 44 except the footnote reference numbers do

not match those in Table S.4.1.a. of HB 44. In addition, the corresponding footnotes in Table S.4.1.a. of Publication 14 are not expressed in tabular format as they are in NIST Handbook 44 (Table S.4.1.b.).

Recommendation:

The subgroup recommends that Table S.4.1.a. and all its corresponding footnotes located on page MDMD-6 of NCWM Publication 14, 2017 edition, be replaced with the two tables shown above to include adding the six new references to note 9 in Table S.4.1.a. and adding new note 9 to Table S.4.1.b.

In addition, the subgroup recommends removing the “Editor’s Note” located directly after the current table in Pub 14.

Discussion: Mr. Darrell Flocken reviewed the changes to Table S.4.1.a. and Table S.4.1.b. of the MDMD Code in NIST Handbook 44 (HB 44) that had been adopted at the 2016 NCWM Annual Meeting. In addition, he presented the recommendation from the MDMD subgroup to amend NCWM Publication 14 to align it with the HB 44 MDMD Code changes. The members of the WG agreed with the recommendation. Upon approval of the NTEP Committee, the adopted wording will be added into the 2019 edition of NCWM Publication 14.

7.1.1.c. Item 3 - as adopted:

S.2.2. Tare. – The tare function...

S.2.2.1. Maximum Value of Tare for Multi-Interval (Variable Division-Value) Devices. – A multi-interval device shall not accept any tare value greater than the maximum capacity of the lowest range of the axis for which the tare is being entered.

(Added 2016)

S.2.2.2. Net Values, Mathematical Agreement. - All net values resulting from a device subtracting a tare entry from a gross value indication shall be indicated and recorded, if so equipped, to the nearest division of the measuring range in which the net value occurs. In instances where the tare value entered on a multi-interval device is in a lower partial measuring range (or segment) than the gross indication, the system shall either alter the tare entered or round the net result after subtraction of the tare in order to achieve correct mathematical agreement.

The following example (of a multi-interval device having two partial measuring ranges for the “x” axis) and accompanying two tables are provided to further clarify the two acceptable methods a device can use to achieve mathematical agreement when tare has been entered in a lower partial measuring range than the gross indication:

Example multi-interval device having two partial measuring ranges for the “x” axis:

- **Partial measuring range 1: 0 – 100 inches by 0.2 inch**
- **Partial measuring range 2: 100 – 300 inches by 0.5 inch**

Table 1: Examples of Acceptable Altering of Tare to Achieve Accurate Net Indication

<u>Gross Indication of Item Being Measured</u>	<u>Tare Entered</u>	<u>Value of Tare after Being Altered by the Device</u>	<u>Acceptable Net Indication</u>
<u>154.5 inches</u>	<u>41.2 inches</u>	<u>41.0 inches</u>	<u>113.5 inches</u>
<u>154.5 inches</u>	<u>41.4 inches</u>	<u>41.5 inches</u>	<u>113.0 inches</u>

Table 2: Examples of Acceptable Rounding of the Net Result (Following the Subtraction of Tare) to Achieve Accurate Net Indication

<u>Gross Indication of Item Being Measured</u>	<u>Tare Entered</u>	<u>Net Result Before Rounding</u> <i>(Gross Indication Minus Tare Entered)</i>	<u>Acceptable Net Indication Rounded to Nearest 0.5 inch</u>
<u>154.5 inches</u>	<u>41.2 inches</u>	<u>113.3 inches</u>	<u>113.5 inches</u>
<u>154.5 inches</u>	<u>41.4 inches</u>	<u>113.1 inches</u>	<u>113.0 inches</u>

(Added 2016)

Amend Table S.4.1.a. Marking Requirements for Multiple Dimension Measuring Equipment as follows:

Table S.4.1.a. Marking Requirements for Multiple Dimension Measuring Systems				
To Be Marked With ↓	Multiple Dimension Measuring Equipment			
	Multiple Dimension Measuring Device and Indicating Element in Same Housing	Indicating Element Not Permanently Attached to Multiple Dimension Measuring Element	Multiple Dimension Measuring Element Not Permanently Attached to the Indicating Element	Other Equipment (1)
Manufacturer's ID	x	x	x	x
Model Designation	x	x	x	x
Serial Number and Prefix	x	x	x	x (2)
Certificate of Conformance Number (8)	x	x	x	x (8)
Minimum and Maximum Dimensions for Each Axis for Each Range in Each Axis (3)	x	x	x	
Value of Measuring Division, d (for each axis and range)	x	x	x	
Temperature Limits (4)	x	x	x	
Minimum & Maximum speed (5)	x	x	x	
Special Application (6)	x	x	x	
Limitation of Use (7)	x	x	x	

(Amended 2016)

Amend paragraph T.2.3. Multi-Interval (Variable Division-Value) Devices and add a new paragraph T.2.4. Mixed-Interval Devices. as follows:

T.2.3. Multi-interval (Variable Division-Value) Devices. – ~~For multi-interval (variable division value) devices,~~
When there exists two or more partial measuring ranges (or segments) specified for any of the “dimensioning” axes (length (x), width (y), or height (z)) and the division values corresponding to those partial measuring ranges (or segments) within the same “dimensioning” axis differ, the tolerance values ~~are~~ shall be based on the value of the ~~device~~ division of the range in use.

(Amended 2016)

T.2.4. Mixed-Interval Devices. - For devices that measure to a different division value in at least one dimensioning axes and all axes are single range, the tolerance values shall be based on the value of the division of the axis in use.
(Added 2016)

The subgroup reviewed the contents of NCWM Publication 14, 2017 edition and recommends the following four additions/changes:

Note: The recommended changes follow the format of the item as presented in the 2017 edition of NIST Handbook 44, which is slightly different then that shown in the 2016 edition of NCWM Publication 16.

Recommendation 1: Add the wording adopted in paragraph S.2.2.1. as a new paragraph numbered 8.6.

8.6. Maximum Value of Tare for Multi-Interval (Variable Division-Value) Devices. – A multi-interval device shall not accept any tare value greater than the maximum capacity of the lowest range of the axis for which the tare is being entered.

Recommendation 2: Add the wording adopted in paragraph S.2.2.2. as a new paragraph numbered 8.7.

8.7. Net Values, Mathematical Agreement. - All net values resulting from a device subtracting a tare entry from a gross value indication shall be indicated and recorded, if so equipped, to the nearest division of the measuring range in which the net value occurs. In instances where the tare value entered on a multi-interval device is in a lower partial measuring range (or segment) than the gross indication, the system shall either alter the tare entered or round the net result after subtraction of the tare in order to achieve correct mathematical agreement.

Consider a multi-interval device having two partial measuring ranges for the “x” axis:

- Partial measuring range 1: 0 – 100 inches by 0.2 inch
- Partial measuring range 2: 100 – 300 inches by 0.5 inch

The following examples clarify the two acceptable methods this device can use to achieve mathematical agreement when tare has been entered in a lower partial measuring range than the gross indication:

<u>Acceptable Example 1.</u>			
<u>Altering of a Tare Entry to Achieve Accurate Net Indication</u>			
<u>Gross Indication of Item Being Measured</u>	<u>Tare Entered</u>	<u>Value of Tare after Being Altered by the Device</u>	<u>Acceptable Net Indication</u>
<u>154.5 inches</u>	<u>41.2 inches</u>	<u>41.0 inches</u>	<u>113.5 inches</u>
<u>154.5 inches</u>	<u>41.4 inches</u>	<u>41.5 inches</u>	<u>113.0 inches</u>

<u>Acceptable Example 2.</u>			
<u>Rounding of the Net Result (Following the Subtraction of Tare) to Achieve Accurate Net Indication</u>			
<u>Gross Indication of Item Being Measured</u>	<u>Tare Entered</u>	<u>Net Result Before Rounding (Gross Indication Minus Tare Entered)</u>	<u>Acceptable Net Indication Rounded to Nearest 0.5 inch</u>
<u>154.5 inches</u>	<u>41.2 inches</u>	<u>113.3 inches</u>	<u>113.5 inches</u>
<u>154.5 inches</u>	<u>41.4 inches</u>	<u>113.1 inches</u>	<u>113.0 inches</u>

Recommendation 3: Amend Table S.4.1.a. Marking Requirements for Multiple Dimension Measuring Equipment:

Minimum and Maximum Dimensions for Each Axis for Each Range in Each Axis (3)	x	x	x	
---	---	---	---	--

Recommendation 4: Amend the Checklist to align the new application of the tolerance value to Multi-Interval (Variable Division-Value) Devices and the new paragraph T.2.4. Mixed-interval Devices

Discussion: Mr. Darrell Flocken reviewed the adopted changes, as shown in agenda item 7.1.7.c, made to the MDMD Code in NIST Handbook from the NCWM, Annual Meeting in July 2016. In addition, he presented the 4 recommendations from the MDMD subgroup to change NCWM Publication 14 to align it with the code changes. The members of the WG agreed with the recommendation. Upon approval of the NTEP Committee, the adopted wording, as recommended in all 4 recommendations will be added into the 2019 edition of Publication.

It was noted during the subgroup's review of NCWM Publication 14 that there is no reference of the tolerance value defined in Handbook 44 or how the tolerance is to be applied to single interval, multi-interval, or mixed Interval operation. The WG members agreed that the tolerance value, and how it should be applied to the instrument's operation should be included in the checklist. Mr. Richard Harshman recommended that this information be included in the checklist as this would be consistent with the checklists for other device types. He also suggested that the WG look at the checklist for Digital Electronic Scales to see if the same, or similar, wording could be used. It was suggested and agreed to that the subgroup would remain intact and develop and present a recommendation on this subject at next year's WG meeting. Mr. Harshman agreed to participate in the subgroup and Mr. Flocken agreed to chair the group.

Members of the subgroup are:

Mr. Sprague Ackley, Honeywell
Mr. Tom Buck, OH Dept. of Agriculture, NTEP Laboratory
Mr. Scott Davidson, Mettler-Toledo, LLC
Mr. Darrell Flocken, NTEP (Chair)
Mr. Richard Harshman, NIST-OWM

Mr. Tony Romeo, Datalogic USA, Inc.
Mr. Dick Suiter, Richard Suiter Consulting
Mr. Pascal Turgeon, MC
Mr. Scott Wigginton, United Parcel Services

Information regarding the group's first conference call will be announced at a later date.

7.1.2. During the 2017 NCWM Annual Meeting, the following proposal to revise Handbook 44 was adopted:

Amend NIST Handbook 44, Multiple Dimension Measuring Devices Code as follows:

S.1.7. Minimum ~~Measurement Lengths~~. – Except for entries of tare, the minimum ~~measurement~~ length to be measured by a device is 12 ~~d~~ divisions. The manufacturer may specify a longer minimum ~~measurement~~ length.
For multi-interval devices, this applies only to the first measuring segment.

S.1.8. Indications Below Minimum and Above Maximum. – When objects are smaller than the minimum dimensions identified in paragraph S.1.7. Minimum ~~Measurement-Lengths~~ or larger than any of the maximum dimensions plus 9 d, and/or maximum volume marked on the device plus 9 d, or when a combination of dimensions, including tare, for the object being measured exceeds the measurement capability of the device, the indicating or recording element shall either:

...

The subgroup reviewed the contents of NCWM Publication 14, 2017 edition and found several places where the word “length” is used to define the measurement of the axes. The subgroup recommends the following changes:

Recommendation 1:

16. Measurement Speed Test

...

Test procedure:

...

10. Place a standard or test object with a length equal to the ~~maximum measurementlength~~ capacity on/in measurement area and observe, and print or record the results.
11. Place a standard or test object with a width equal to the ~~maximum measurementwidth~~ capacity on/in measurement area and observe, and print or record the results.
12. Place a standard or test object with a height equal to the ~~maximum measurementheight~~ capacity on/in measurement area and observe, and print or record the results.
13. Place a standard or test object with a length equal to the ~~minimum measurementlength~~ capacity on/in measurement area and observe, and print or record the results.
14. Place a standard or test object with a width equal to the ~~minimum measurementwidth~~ capacity on/in measurement area and observe, and print or record the results.
15. Place a standard or test object with a height equal to the ~~minimum measurementheight~~ capacity on/in measurement area and observe, and print or record the results.

Recommendation 2: Revise Footnote 6 in Table S.4.1.a. by removing the word “length”

⁶ Multiple dimension measuring devices, which require that the object or device be moved relative to one another, shall be marked with the ~~length~~ minimum and maximum speeds at which the device is capable of making measurements that are within the applicable tolerances.

Discussion: Mr. Darrell Flocken reviewed the adopted changes, as shown in agenda item 7.1.2, made to the MDMD Code in NIST Handbook from the NCWM, Annual Meeting in July 2017. In addition, he presented the recommendation from the MDMD subgroup to change Publication 14 to align it with the code changes. The members of the WG agreed with the recommendation. Upon approval of the NTEP Committee, the adopted wording will be added into the 2019 edition of Publication.

8. Report on progress from multi-interval operation requirements subgroup

Source: Multi-Interval Operation Requirements Subgroup

Background /Discussion: During the October 2014 meeting the work group agreed to form a small subgroup charged with the task to develop requirements that address multi-interval operation for inclusion into both HB-44 and Pub 14. Members of the subgroup are as follows: Mr. Darrell Flocken, Mr. Rick Harshman, Mr. Scott Davidson, Mr. Justin Rae, and Mr. Scott Wigginton.

Recommendation: The Work Group will be updated on their progress.

Discussion: Mr. Richard Harshman (Chair of the subgroup) informed the members that based on the adoption of the information discussed in agenda item 7, the work of this subgroup is complete and the subgroup has been disbanded. This item will not appear in the WG's 2019 agenda.

New Items

9. In-motion Forklift based Pallet Dimensioning

Recently, several NTEP Certificates of Conformance have been issued to devices designed to measure palletized freight while being transported (in-motion) on a forklift truck. The Ohio Lab, in conjunction with the device manufacturer, has created a series of tests used during the evaluation. Mike Kelly will lead a discussion on these test procedures and the Work Group members are asked to consider if these tests are appropriate and if they should be added to the Publication 14 Checklist.

Discussion: Mr. Mike Kelly (Ohio, NTEP Laboratory) lead a discussion regarding the test procedures to evaluate a dimensioning system used to measure palletized freight while being transported (in-motion) by a lift truck. Mr. Kelly has worked with 3 separate manufacturers in the evaluation of this device type and as a result of this, has developed some tests specific to these devices. A brief overview of the new tests along with the interpretation of the results was presented. While all WG members agreed that additional tests are needed, some WG members felt that some of the proposed tests could be incorporated into existing test procedures. One example of this was a shift test; for devices that measure an object statically this test consists of placing the object at various locations within the measuring field. One of the tests proposed for the device under discussion was a positioning test where the fork truck was to be run thru the measuring area at different positions across the measuring field. Some members felt that a revision and, possibly, a renaming of the existing shift test, could provide the same intent. A copy of Mr. Kelly's presentation slides used in the discussion of this item can be found in Appendix B of this Summary Report. (Note: the attached presentation is not to be considered a recommendation to the WG but only information used by Mr. Kelly during the open discussion.)

After some discussion, it was mentioned that it may be in the best interest of the WG to form a subgroup focused on this topic. WG members agreed and a subgroup was formed. Mr. Bruce Budinger (Northrop Grumman / AOA Xinetics) volunteered to Chair the group.

Mr. Kelly offered to share illustrations/explanations of his test procedures with the subgroup as a starting point. It was agreed that the subgroup would try to have a completed draft proposal for consideration by the WG at the 2019 MDMD WG meeting.

Members of the subgroup are:

Mr. Sprague Ackley, Honeywell
Mr. Mike Kelly, OH Dept. of Agriculture, NTEP Laboratory
Mr. Bruce Budinger, Northrop Grumman / AOA Xinetics (Chair)
Mr. Tom Buck, OH Dept. of Agriculture, NTEP Laboratory
Mr. Scott Davidson, Mettler-Toledo, LLC
Mr. Darrell Flocken, NTEP
Mr. Richard Harshman, NIST-OWM

Mr. Robert Kennington, Quantronix, Inc.
Mr. Don Newell, NMFTA
Mr. Chris Senneff, Rice Lake Weighing Systems
Mr. Dick Suiter, Richard Suiter Consulting
Mr. Pascal Turgeon, Measurement Canada
Mr. Scott Wigginton, United Parcel Services
Mr. Scott Henry, Zebra Technologies Corp.

Information regarding the group's first conference call will be communicated at a later date.

10. Misc Items for General Discussion

During recent NTEP evaluations, the Ohio Lab has been asked to evaluate a few device features and /or functions. These included:

1. Handheld Device.
2. Manual entry of a measurement value.
3. Tare value entry.

Mike Kelly will lead a discussion on these tests with the Work Group Members regarding these items.

Discussion: Mr. Mike Kelly (Ohio, NTEP Laboratory) led a discussion on the 3 items mentioned in the agenda. The summary of the discussion is provided below.

1. The discussion involved an example of a handheld device where a photo of the object to be measured was taken and then the object to be measured was manually adjusted to fit inside a box shaped outline on the screen of the device. This was then used to determine the objects dimensions. The result of the discussion was that some manufacturers and users seemed okay with the operator adjusting box size on the screen; however, regulators and NIST did not.
2. The result of the discussion on this item was that a device where the measurements are hand entered would not need an NTEP CC. While this was the majority opinion, it was not the overall consensus of the WG.
3. This discussion involved the thought that the tare value could be entered into the device in a smaller size than the "d" value for the axis and that a tare value could only be entered for the horizontal axis. The result of the discussion was that, the tare value must be in the same unit of measurement and to the same resolution as "d." Additionally, it was agreed that while there seems to be no need for entering a manual tare in either the length or width axes, there was no consensus to define this limitation. It was also suggested that the height of the skid, for which a manual tare will be entered during testing should be a multiple of the value of the height resolution (d) of the device.

11. Removal of the "Provisional" (P) Status on the NTEP Certificates of Conformance

During the May 2017 MDMD WG meeting, the question was raised regarding the removal of the "Provisional" (P) status on existing NTEP Certificates of Conformance (CC). Specifically, what is the determining factor(s) necessary to end the issuing of provisional certificates and what impact would its removal have on current NTEP Certificates of Conformance?

Removal of the Provisional Status is based on the completeness of the Publication 14, checklist for the device; once the WG and the NTEP Administrator agree that the evaluation checklist addresses all requirements as mentioned in the most recent edition of *NIST, Handbook 44*, for the device type, NTEP will begin issuing certificates without the provisional status.

Additional, when the decision is made to stop issuing provisional certificates, NTEP will review all certificates with a provisional status: the review will consist of comparing the features, options, and test conditions, shown on the certificate, to the requirements in the most recent edition of the published checklist. The review would identify any new or changed requirements that were adopted after the issuance of each CC. Any new or changed requirement identified could result in the need for additional testing. The provisional status will be removed after any identified additional testing is successfully completed. If no additional testing is identified, the provisional status will be removed and NTEP will reissue the CC.

For additional information related to provisional certificates, refer to Publication 14, Administrative Policy, Section 12.3 and Section 14.

Discussion: During last year's meeting, the WG members asked about the process of removing the Provisional Status for existing and future NTEP Certificates of Conformance (CC.) During this year's meeting, Mr. Darrell Flocken provided the WG member with the following information:

1. Provisional Status will be removed when either the WG or the NTEP Administrator feels the evaluation checklist in Publication 14 has addresses all current requirements as defined in the most recent edition of NIST Handbook 44.
2. Once agreed to stop issuing Provisional Certificates of Conformance, NTEP will review all "Active" CCs to compare the test criteria used to issue the CC to the test criteria listed in the most current edition of the Publication 14 Checklist. The intent is to identify all devices that may require additional testing based on new or revised test criteria developed after the CC was issued and deemed to be applicable to the model listed on the CC.
3. Upon completion of the CC review, the manufacturer will be informed, by email or letter, that additional testing is or is not required.
 - a. If no additional testing is required, NTEP will reissue the CC with the Provisional Status removed.
 - b. If additional testing is deemed necessary, the manufacturer will be informed and given 90 days to schedule the additional tests. When all additional tests are successfully completed, NTEP will reissue the CC with the Provisional Status removed.

Note: in either case, the manufacturer will not be required to submit an application and will not be charged an application or certificate revision fee. The manufacturer will be responsible for any and all NTEP Lab fees associated with performing the required tests.

The WG members were informed that the decision to remove the Provisional status was made and NTEP will begin the CC review process. Manufacturers are not required to take any actions until they receive the letter informing them of the results of the CC review process.

Closing Discussion

12. Review meeting activities and conclusions

Discussion: Nothing specific to report.

13. Define next steps (if needed)

Discussion: The assigned action items from this meeting are:

- a. The continuation of the subgroup tasked with developing proposed changes to the MDMD Checklist in NCWM Publication 14 to include the device tolerance value and an explanation of how the tolerance value is to be applied during the evaluation of the different modes of operation, e.g., single interval, multi-interval, etc. The subgroup is tasked with developing a draft proposal for possible consideration by members at the WG's 2019 meeting.
- b. A new subgroup will form to develop proposed changes to the MDMD Checklist for the evaluation of measuring palletized freight being transported (in-motion) on a lift truck. The subgroup is tasked with developing a draft proposal for possible consideration by members at the WG's 2019 meeting.
- c. NTEP will begin the CC review and notification to manufacturers of the need for any additional testing for the intent of removing the Provisional status from all "Active" CCs.

14. Chairman's discussion

Discussion: Mr. Robert Kennington (WG Chair) informed the WG members that he will be resigning the Chair position at the end of this meeting. Mr. Flocken took the opportunity to explain the process to locate the WG's next Chair. In short, the process is:

1. All WG members will receive an email from Mr. Darrell Flocken, asking for nominations for the position. The member can nominate another WG member or they can nominate themselves.
2. Once the nomination deadline is reached, each nominee will be contacted to see if they wish to be considered for the position.
3. An email, including the name of each nominee will be sent to the WG members asking for their selection/vote.
4. Once the voting deadline is reached, the individual with the most votes will be informed after which an email will be sent out informing all WG Members of the new Chair.

The deadline for the process will be no later than mid-December 2018 as the new Chair must be “officially” appointed by the NCWM, Interim Meeting scheduled for January 2019.

Mr. Flocken also took the opportunity to remind the WG members that the WG is charged with appointing a WG member with the responsibilities of developing the meeting agenda and the meeting summary/minutes. This individual can be appointed by the WG members or the Chair. NTEP will assist in the transition of this responsibility and be available to provide ongoing support for the meeting and the documents.

15. Next meeting

The work group is encouraged to recommend a date and location for the next work group meeting. The recommendation will be presented to the NTEP Committee for review and approval. The work group should maintain, at a minimum, a yearly meeting schedule.

Discussion: The members agreed that the 2019 meeting will Tuesday, May 7th from 1:00 pm to 5:00 pm and Wednesday, May 8th from 8:00 am to 5:00 pm. The meeting will be held at the Ohio Department of Agriculture, Administration Building, Conference room 129. (Alternative dates of May 14th and 15th were agreed to if needed.)

Appendix A, Meeting Agenda Item iii

2018 MDMD Work Group Agenda Item iii.: OWM's proposals to address weighing and measuring equipment in which the configuration or calibration parameters can be changed using a removable digital storage device, such as an SD card, USB flash drive, etc., that must remain in the device for the device to be operational.

The OWM proposals are contained in Block 7 of the 2018 Specifications and Tolerances (S&T) Committee's Interim Report (NCWM Publication 16). The following is a link to that report:

http://www.ncwm.net/_resources/e30d:p74t7a-1x8/files/76035627zccf278df/_fn/4-ST-Web.pdf

There are 19 items in Block 7. The main item is a proposal to add a new General Code paragraph G-S.8.2. as follows:

B7: GEN-2 D G-S.8.2. Devices and Systems Adjusted Using Removable Digital Device Storage

Item Under Consideration:

Modify the General Code as follows

G-S.8.2. Devices and Systems Adjusted Using Removable Digital Storage Device. - For devices and systems in which the configuration or calibration parameters can be changed by use of a removable digital storage device, such as a secure digital (SD) card, USB flash drive, etc., security shall be provided for those parameters using either (1) an event logger in the device; or (2) a physical seal that must be broken in order to remove the digital storage device from the device (or system). If security is provided using an event logger, the event logger shall include an event counter (000 to 999), the parameter ID, the date and time of the change, and the new value of the parameter. A printed copy of the information must be available on demand through the device or through another on-site device. In addition to providing a printed copy of the information, the information may be made available electronically. The event logger shall have a capacity to retain records equal to 10 times the number of sealable parameters in the device, but not more than 1000 records are required. (Note: Does not require 1000 changes to be stored for each parameter.)

(Added 20XX)

The purpose of all the remaining items in the block, including the proposed changes to MDMD code paragraph S.1.11. is to direct readers to the new General Code paragraph when they encounter a device or system that can be adjusted using a removable digital storage device.

B7: MDM-1 D S.1.11. Provision for Sealing.

Item Under Consideration:

Modify Multiple Dimension Measuring Devices Code as follows:

S.1.11. Provision for Sealing. - For devices and systems in which the configuration or calibration parameters can be changed by use of a removable digital storage device, security shall be provided for those parameters as specified in G-S.8.2. For parameters adjusted using other means, the following applies:

- (a) **A The device or system** shall be designed with provision(s) for applying a security seal that must be broken, or for using other approved means of providing security (e.g., data change audit trail available at the time of inspection), before any change that detrimentally affects the metrological integrity **of the device** can be made to any measuring element.
- (b) Audit trails shall use the format set forth in Table S.1.11. Categories of Devices and Methods of Sealing for Multiple Dimension Measuring Systems.

(Amended 20XX)

Appendix B, Presentation/Discussion on In-motion Palletized Freight, by Mr. Kelly

In- motion Palletized Freight

Checklists and Test Procedures

1. Marking - Complete DevicesError! Bookmark not defined.
2. Sealing.....Error! Bookmark not defined.
3. Indicating and Recording Elements – GeneralError! Bookmark not defined.
4. Values DefinedError! Bookmark not defined.
5. TareError! Bookmark not defined.
6. Tare Operation - Facilitation of Fraud.....Error! Bookmark not defined.
7. Recorded RepresentationsError! Bookmark not defined.
8. Design of Zero and Tare.....Error! Bookmark not defined.
9. Systems with Two or More Measuring ElementsError! Bookmark not defined.
10. Verification of Usage (Field Testing only)Error! Bookmark not defined.
11. Operating Temperature Verification of Warm-up Time (Accuracy After Cold Start)..Error! Bookmark not defined.
12. Performance Tests.....Error! Bookmark not defined.
13. Position Test.....Error! Bookmark not defined.
14. Conveyor Belt Seam Test.....Error! Bookmark not defined.
15. Variable Orientation Test.....Error! Bookmark not defined.
16. Measurement Speed TestError! Bookmark not defined.
17. Minimum Spacing Test.....Error! Bookmark not defined.
18. Touching Objects TestError! Bookmark not defined.
19. Irregularly Shaped Objects Test.....Error! Bookmark not defined.
20. Drag Test.....Error! Bookmark not defined.
21. Minimum and Maximum Measurement Capabilities.....Error! Bookmark not defined.
22. Power Voltage.....Error! Bookmark not defined.
23. Influence Factor

In- motion Palletized Freight

1. **Sensor / Emitter Obstruction Test:** (section 12 Performance test)

Block all sensors or emitters one at a time.

The purpose of this test is to verify the behavior of the DUT

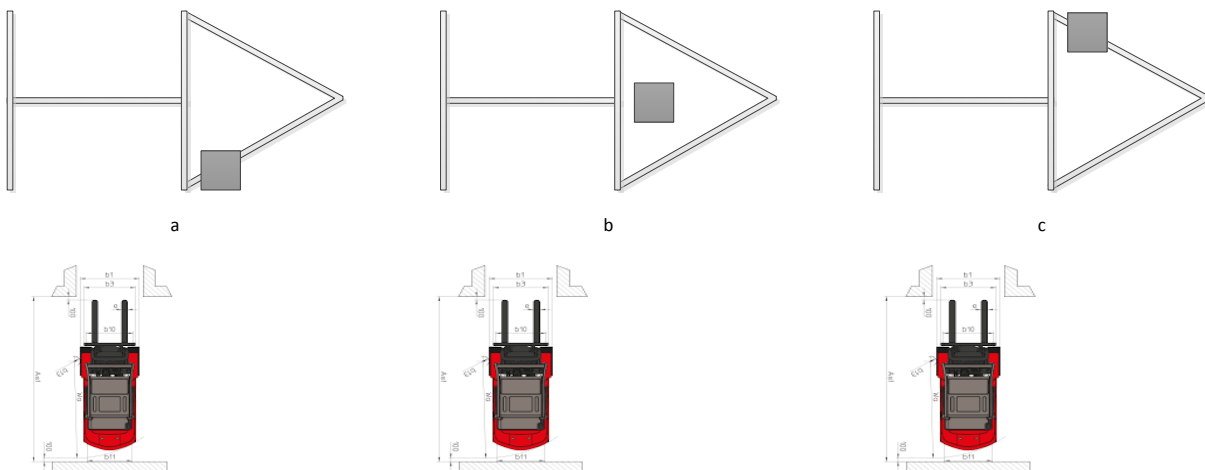
2. **Forklift Sensor Test :** (section 12 Performance test)

Block all sensors on the forklift one at a time.

The purpose of this test is to verify the behavior of the DUT

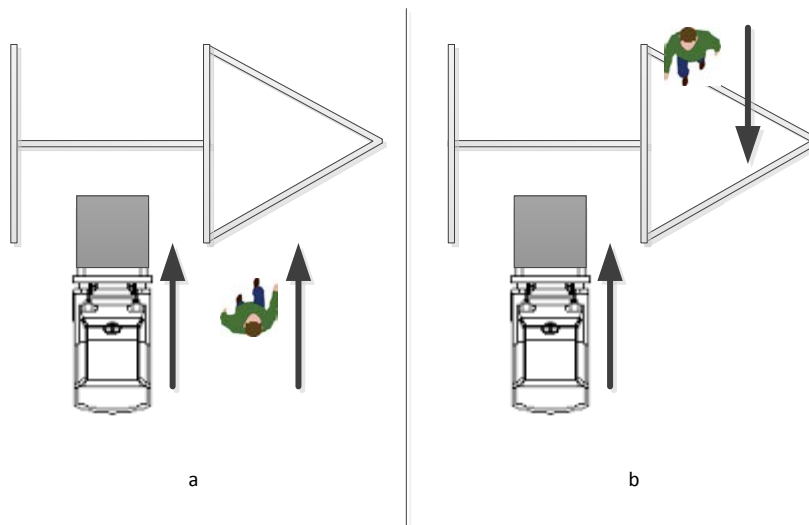
3. **Static Object in the Field of View:** (section 12 Performance test)

The purpose of this test is to verify the behavior of the DUT when a static object is placed in the field of view.



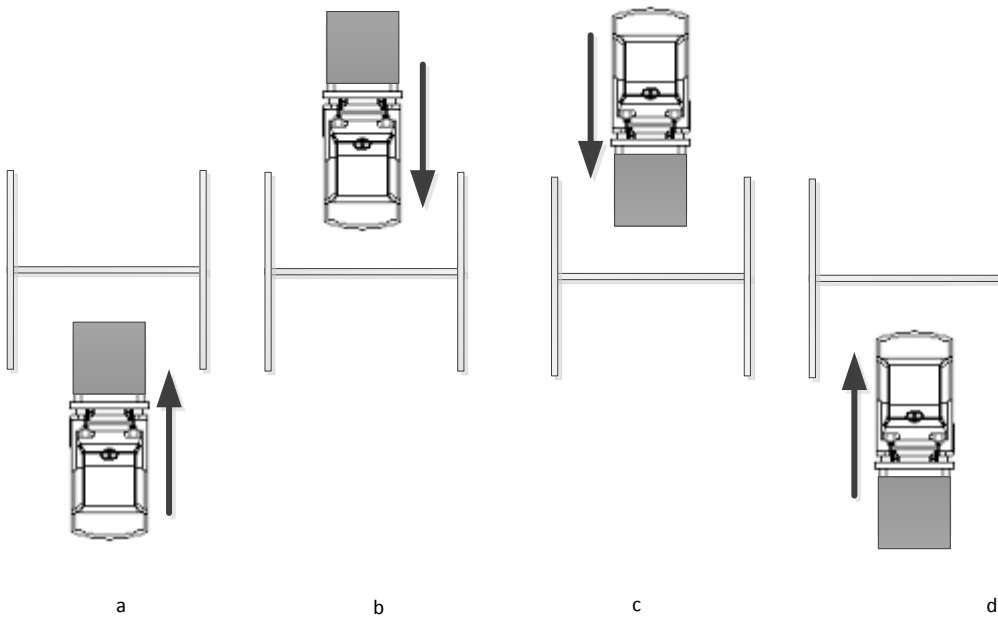
4. **Moving Secondary Object:** (section 12 Performance test)

The purpose of this test is to verify that appropriate feedback when a forklift and another moving object move through the field of view at the same time.



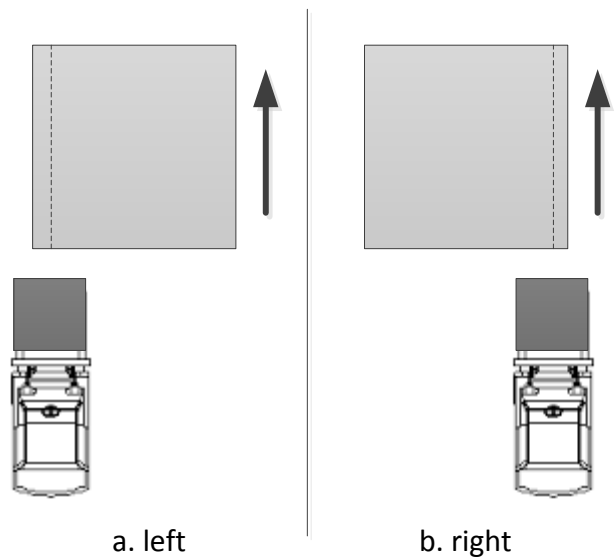
5. Forklift Orientation Test: (section 13 Performance test)

The purpose of this test is to verify that the system measures an object independent of the forklift orientation.



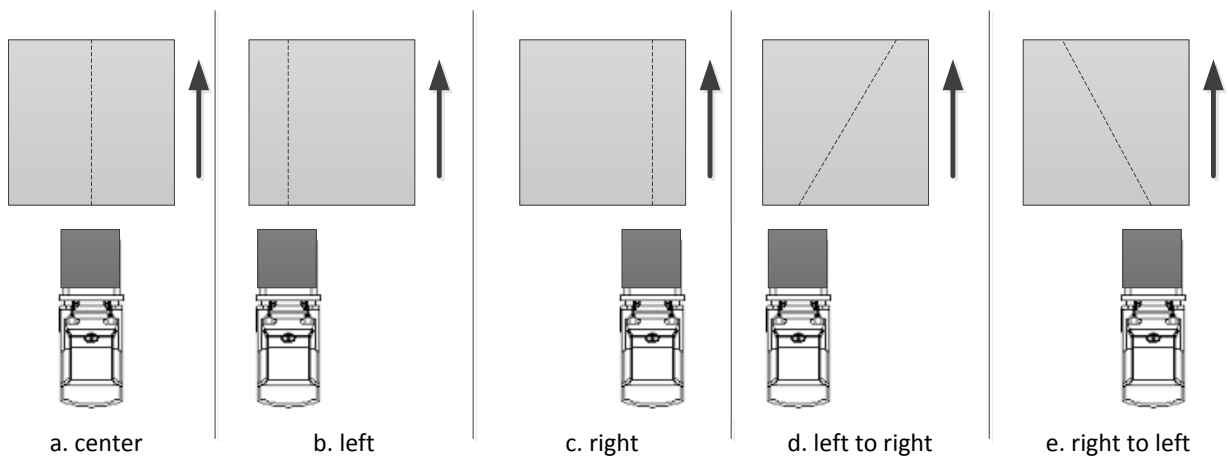
6. OUT OF BOUNDS TEST (SECTION 13 POSITION TEST)

The purpose of this test is to verify that the system will indicate an out of bounds error when an object travels outside the floor markings.



7. Shift Test Procedure: (section 13 Position test)

The purpose of this test is to verify that the system measures objects as they pass through the marked area on the floor.



8. **Minimum & Maximum (fork) Height from floor** (section 21 Min/Max test)

The purpose of this test is to verify that the system measures min. & max height off the floor.

