

**Multiple Dimension Measuring Device Work Group  
May 12-13, 2015 - Reynoldsburg, Ohio  
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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](http://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 WGs 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):
  - $dx_1 = dy_1 = dz_1, dx_2 = dy_2 = dz_2$ , etc. (example if all 3 axes were multi-interval.) This same relationship would apply if only 2 axes used multi-intervals. In that case  $dx_1 = dy_1, dx_2 = dy_2$ , etc. );
  - scale intervals  $d_1 < d_2 < d_3 \dots d_r$ ;
  - $\min = \min_1, \max = \max_1, \max_1 = \min_2$ , 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 22<sup>nd</sup> and 23<sup>rd</sup>. 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)			
<b>1. Date:</b>	<b>2. Regional Association(s):</b> <input type="checkbox"/> Central (CWMA) <input type="checkbox"/> Northeastern (NEWMA) <input type="checkbox"/> Southern (SWMA) <input type="checkbox"/> Western (WWMA)		<b>3. Standing Committee:</b> <input type="checkbox"/> L&R <input type="checkbox"/> S&T <input type="checkbox"/> PDC
<b>4. Submitter Name:</b> Rick Harshman (NIST OWM) on behalf of the Multiple Dimension Measuring Devices Work Group			
<b>5. Street Address:</b>			
<b>6. City:</b>	<b>7. State:</b>	<b>8. Zip Code:</b>	<b>9. Country:</b>

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

13. Purpose:

14. Handbook to be Amended:  
 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:

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

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 <b>Each Range in Each Axis</b> (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:

DRAFT - not for distribution