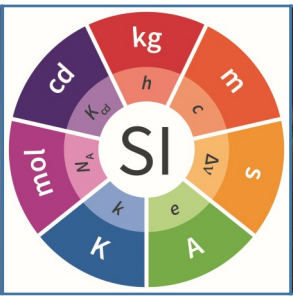
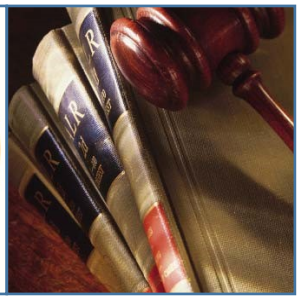
WEIGHTS & MEASURES CONNECTION





October 2020

Volume 10, Issue 3

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Making Sense of the "Min" Marking on Class I and II Scales

Byline: Rick Harshman

If you've been involved lately in the inspection of high-precision Class I and/or Class II scales, you've probably noticed some scale manufacturers are designating a "Min" value by marking it on the scale. This marking generally appears on the reading face of the scale. Like me, you've probably thought of the "Min" value as being the minimum acceptable load to be weighed for the scale to be suitable for its application based on its accuracy class. After all, who best to specify a minimum acceptable load than a scale's manufacturer? If, however, you delved a little deeper and considered this value in relation to the value of the verification scale division (e) and scale division (d) on scales you've inspected, you will have noticed the "Min" value can sometimes be as small as 5 (e) on scales in which (e) and (d) are different values.

The marking of such a small "Min" value in relation to a scale's verification scale division raises a lot of questions, especially considering such designation is that of the manufacturer. Some of the common questions that have been raised by inspectors and industry include:

- What is "Min" and why are some scale manufacturers marking its value on scales they produce?
- Why, in some cases, is the value designated so small (e.g., only 5 (e)?
- Can a scale be considered suitable for weighing loads this small?
- How does the "Min" value specified on a scale relate to the recommended minimum loads specified in NIST Handbook 44 (HB 44) Scales Code Table 8?

The purpose of this article is to answer these questions and provide guidance to field officials on determining the smallest acceptable load to be weighed on scales they are inspecting. First let's review some terminology associated with the values and increments displayed on a scale used in HB 44. Those terms and their definitions are as follows:

- **scale division, value of (d)**. The value of the scale division, expressed in units of mass, is the smallest subdivision of the scale for analog indication or the difference between two consecutively indicated or printed values for digital indication or printing. (Also see "verification scale division.") [2.20, 2.22]

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- **verification scale division, value of (e).** A value, expressed in units of weight (mass) and specified by the manufacturer of a device, by which the tolerance values and the accuracy class applicable to the device are determined. The verification scale division is applied to all scales, in particular to ungraduated devices since they have no graduations. The verification scale division (e) may be different from the displayed scale division (d) for certain other devices used for weight classifying or weighing in pre-determined amounts, and certain other Class I and II scales. [2.20]

Note from the definition of "verification scale division, value of (e)" that the value of (e) is specified by the manufacturer of the device. The value of (e) is not required to be marked on a scale if it equals the value of (d) and on most scales, such a designation is not present since (e) and (d) are typically equal.

"Min" is an abbreviation used in International Recommendation OIML R 76 Non-automatic weighing instruments (R 76) for the term "Minimum Capacity." The term is defined in R 76 as follows:

- **Minimum capacity (Min)** Value of the load below which the weighing results may be subject to an excessive relative error.

R 76 also specifies that the value of the minimum capacity (Min) is designated to indicate that use of the instrument below this value is likely to give rise to considerable relative errors.

The criteria contained in R 76 is intended for type evaluation and not field enforcement. For this reason, there are no user requirements included in R 76. The marking of a scale's minimum capacity (Min) is a requirement of R 76. Its designation on a scale submitted by a manufacturer to OIML for certification makes possible the issuance of an OIML Certificate once all other type-evaluation criteria is met. The issuance of an OIML Certificate provides opportunity for a manufacturer to market scales internationally in the different countries that adopt OIML R 76 and require an OIML Certificate.

NIST Handbook 44 (HB 44, which has been adopted in some form by all U.S. weights and measures jurisdictions) does not require a "Min" value be marked on scales; but instead, includes a User Requirement in the Scales Code that provides recommended minimum loads based on a scale's accuracy class. OWM views the meaning of the OIML term, "Minimum capacity (Min)" and the HB 44 term, "minimum load" to be the same. Although not required by HB 44, it is likely the "Min" marking appears on many of the commercial application scales sold in the U.S. because it is more cost effective for manufacturers to build a single scale with a common marking for both international and U.S. markets.

The parameters for scale accuracy class included in R 76 Table 3 Classification of Instruments (recreated below) are nearly identical to those in HB 44 Scales Code Table 3 Parameters for Accuracy Class. One significant difference is that R 76 does not recognize the HB 44 Class IIIL as an accuracy class, which is why it is not included in the table below. Some less significant differences are:

- R 76 limits the maximum number of scale divisions for Class IIII scales to 1 000, whereas HB 44 specifies a maximum of 1 200 divisions.
- There is an exception in R 76 Table 3 for Class I scales. The exception, found in R 76 paragraph 3.4.4., states that the minimum of 50 000 verification scale intervals does not apply to Class I scales with d < 0.1 mg. No such exception exists in HB 44.

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OIML R76 Table 3 (Classification of Instruments)

Accuracy class	Verification scale interval, *e*	Number of verification scale intervals, *n* = Max/*e*		Minimum capacity, Min (Lower limit)
		minimum	maximum	
Special (I)	0.001 g ≤ *e**	50 000**	–	100 *e*
High (II)	0.001 g ≤ *e* ≤ 0.05 g 0.1 g ≤ *e*	100 5 000	100 000 100 000	20 *e* 50 *e*
Medium (III)	0.1 g ≤ *e* ≤ 2 g 5 g ≤ *e*	100 500	10 000 10 000	20 *e* 20 *e*
Ordinary (IIII)	5 g ≤ *e*	100	1 000	10 *e*

* It is not normally feasible to test and verify an instrument to e < 1 mg, due to the uncertainty of the test loads.
** See exception in 3.4.4.

Notice too, Table 3 of R 76 includes an additional column to the right, which provides the Minimum capacity (Min) for the different accuracy classes of scales. The values specified in this column correspond to the "recommended" minimum loads specified in HB 44 Scales Code Table 8. What makes the "Minimum capacity (Min) values" specified in R 76 Table 3 different than the "recommended minimum load values" specified in HB 44 Scales Code Table 8 are instructions contained in OIML R 76 paragraph 3.4.3. Minimum capacity. These instructions in R 76 are to replace the verification scale interval (e) with the actual scale division (d) in the last column of Table 3 (i.e., the last column to the right). R 76 paragraph 3.4.3. is copied below.

3.4.3 Minimum capacity

The minimum capacity of the instrument is determined in conformity with the requirements in Table 3. However, in the last column of this Table, the verification scale interval, e, is replaced by the actual scale interval, d.

OIML R 76 Paragraph 3.4.3 Minimum capacity. OWM's understanding of these instructions (in paragraph 3.4.3) is that when (e) and (d) are different values on a scale (which is often the case with Class I and II scales), it is the (d) value on which scale manufacturers are to base the marking of "Min." Several photos of Class I and Class II scales recently shared with OWM by different states provide an indication that scale manufacturers are, in fact, basing the Min marking on the value of (d), rather than (e). That is, on photos of scales in which a "Min" value is marked, its value equals the product of multiplying the Min-capacity value corresponding to the scale specified in Table 3 by the scale's value of (d). That is:

(Min-capacity value in Table 3) x (scale's value of "d")

This equation accounts for why the marked Min value can be as little as 5 (e) on some scales. That is, when the value of (d) is one-tenth (e) and the Min-capacity value in Table 3 is 50 (which corresponds when the value of e ≥ 0.1 g on Class II scales), multiplying the factor "50" by the value of (d) results in a product equal to only 5 (e).

Example: Class II scale: e = 0.1 g d = 0.01g 50 x 0.01 g = 0.5 g

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Such marking, unfortunately, conflicts with OWM's interpretation (and seemingly that of many U.S. weighing experts) of how the values in HB 44 Scales Code Table 8 apply to scales in which (e) and (d) are different values. That is, the opinion that recommended minimum loads are to be based on the value of (e), not (d), since both "parameters for scale accuracy class" and "applicable tolerance values" in HB 44 are based on the verification scale division (e). OWM notes it was recently concluded by the National Type Evaluation Program's (NTEP's) administrator; the NTEP Weighing Sector's technical advisor; and NTEP weighing evaluators (during the 2018 NTEP Lab Meeting); and members of the Weighing Sector (during the 2019 Weighing Sector Meeting), that the application of NIST HB 44 requirements in all cases are intended to be based on the verification scale division (e). This would include the recommended minimum load values specified in Scales Code Table 8. This conclusion aligns with a guiding principle of HB 44 that the same requirements should apply to scales used in the same application regardless of technology or design.

It is important to base a scale's minimum acceptable load on the value of (e) when considering the effects of tolerance application and digital rounding. The HB 44 maintenance tolerance applicable to Class I and Class II scales is as follows:

Accuracy Class	Test Loads (e)	Maintenance Tolerance (HB 44)
Class I	0 to 50 000 e	1e
Class II	0 to 5 000 e	1e

This tolerance of 1 (e), alone, can result in a considerably large relative error when basing the minimum acceptable load on the verification scale division (e). For example, the recommended minimum load specified in Scales Code Table 8 for a Class II scale having a value of (e) equal to 0.001 g to 0.05 g is 20 (e). If this scale were used to weigh a load of 20 (e), the scale error of 1 (e) represents 5 % of the load weighed:

$$1 \text{ e} \div 20 \text{ e} = 0.05 \times 100 = 5 \%$$

Next, consider the effect of using the same scale to weigh a load equal to 20 (d). If (d) were equal to one-tenth the value of (e) [which is normally the case for Class I and II scales with different values of (d) and (e)] an error of 1 (e) represents 50 % of a load of 20 (d):

$$1 \text{ e} \div 2 \text{ e} = 0.5 \times 100 = 50 \%$$

Note, the denominator of 2 (e) in these calculations is the equivalent of 20 (d) since (d) = 1/10 (e) in this example. This tenfold increase in relative error (i.e., from 5 % to 50 %) is solely the result of basing the minimum acceptable load on the (d) value, which in the example provided, is one-tenth the (e) value. These two examples highlight the importance of basing the minimum acceptable load on (e) when (e) and (d) are different values on a Class I or Class II scale.

The potential error caused by the rounding of digital values to the nearest minimum increment is less of a concern on Class I and II scales when (e) and (d) are different values than when they are equal, providing both (e) and (d) are read together when using the scale. This is because when (e) and (d) are different values on a Class I or II scale, the value of (e) does not round, but rather advances and declines in value only at the point when the entire range of the (d) resolution has been exceeded. Because applicable tolerances are based on (e), any rounding effect of the (d) resolution can be considered negligible when (d) is one-tenth the value of (e); which is generally, but not always the case.

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It is because of the effect of tolerance application; digital rounding; and other factors which cause measurement uncertainty, that it is generally recommended most loads weighed on a scale be between one-quarter and three-quarters of scale capacity. Weighing of loads close to or equal in value to the recommended minimums specified in HB 44 Table 8 should not be the norm, but rather the occasional exception. OWM recognizes this is not always the case.

OWM is not aware of the reason(s) why a provision exists in R 76 specifying use of the actual scale division (d) to establish the minimum capacity to be marked on scales. Such marking on Class I and II scales with different values of (e) and (d) puts U.S. field officials in a very challenging position if they strive to properly enforce scale suitability by using the (e) value to determine minimum acceptable loads. R 76 is currently under revision, having last been revised in 2006. Because there is disagreement between R 76 and HB 44 with respect to the determination of the minimum acceptable load, OWM recently drafted an e-mail inquiry to the Conveners of R 76 (Germany and France) requesting an explanation of the technical justification for using (d) rather than (e) for this determination on Class I and II scales. There has been no response to date on this inquiry. Additionally, OWM discussed the concern with NTEP's Administrator, who concurred the recommended minimum loads specified in Table 8 are intended to be based on the (e) value in all cases. OWM requested NTEP consider adding a statement to the NTEP Certificates of Conformance for those Class I and II scales in which (e) and (d) are different values, making clear the "Min" marking represents the minimum capacity value, which is an OIML marking requirement. In the U.S., recommended minimum loads are based on a scale's verification scale division (e). OWM's request is currently being considered by NTEP.

During the 2020 NCWM Interim Meeting, the Specifications and Tolerances Committee agreed to request the Chairman of the NCWM form a Task Group to review the Scales Code of NIST Handbook 44 and relevant portions of OIML R 76 and recommend changes as necessary to:

1. Clarify how error is determined in relation to the verification scale division (e) and the scale division (d);
2. Clarify which is the proper reference throughout the Scales Code:
   - the verification scale division (e); or
   - the scale division (d).
3. Ensure proper selection of a scale in reference to the verification scale division (e) and the scale division (d); and
4. Clarify the relationship between the verification scale division (e) and the scale division (d).

Assuming the Chairman agrees to this request, OWM expects the Min capacity issue along with other concerns related to the use of (d) and (e) to be further discussed and addressed by the NCWM Task Group.

For additional information relating to this article, contact Rick Harshman by email at **richard.harshman@nist.gov** or by phone at (301) 975-8107.

Final Notice on Deprecation of the U.S. Survey Foot Issued

Byline: Elizabeth Benham

On October 5, 2020, it is planned that the National Institute of Standards and Technology (NIST) will publish a final notice titled "Deprecation of the United States (U.S.) Survey Foot" in the Federal Register. In the notice, NIST and the National Geodetic Survey (NGS), National Ocean Service (NOS), National Oceanic and Atmospheric Administration (NOAA), will announce they have taken collaborative action to deprecate the U.S. survey foot and require that its use for all applications in the United States, including surveying, mapping, and engineering, be discontinued after December 31, 2022. The goal of this action is to provide national uniformity of length measurement in an orderly fashion with minimum disruption, correcting a measurement dilemma that has persisted for over 60 years.

Until 1960, the SI standard of length was disseminated using platinum-iridium meter bars such as these from the NIST Museum.

Beginning January 1, 2023, any measurement data derived from or published as a result of surveying, mapping, or any other activity within the U.S. that is expressed in terms of feet should only be based on the definition of one foot being equal to 0.3048 meter (exactly). This definition was named the "international foot" in a 1959 Federal Register Notice (24 FR 5348) that officially changed the foot definition for the U.S. In the 1959 notice, a second definition of the foot was named the "U.S. survey foot," with a mandate that it be used only for geodetic surveying, and that it would ultimately be replaced by the international foot definition.

With this final notice, the mandate to replace the U.S. survey foot with the international foot definition for all applications will be achieved, and after December 31, 2022, there will be one legal definition of the foot in the United States. The preferred term will be the "foot," which is the name currently used in everyday measurements of length or distance. Because there are significant differences between traditional measurement systems (e.g., "Imperial" or "British" systems), NIST recommends use of the term "U.S. customary system of measurement" to describe the collection of non-SI measurement units currently used in the U.S. International foot definitions for traditional linear units, such as the cable's length, chain, link, rod, and acre will also be announced in the notice. These changes will be reflected in the next editions of NIST Special Publication (SP) 811, "Guide for the Use of the International System of Units (SI)," and Handbooks under the sections on units and systems of measurement and conversion tables.

NIST and NOAA encourage states and other government agencies, businesses, private and public organizations, and others potentially impacted by this change to take immediate steps for planning for the transition. Early action is important, since some changes can be time intensive, such as enacting state legislation and updating software, training materials, and relevant procedures. Recommended actions are published in the Federal Register Notice. The final Federal Register Notice will be available after October 5, 2020 at **www.nist.gov/pml/us-surveyfoot/frn-citations.** For more on the history of the U.S. survey foot to learn how the change will impact land surveys and mapping see NIST's Frequently Asked Questions at **www.nist.gov/pml/us-surveyfoot/frequently-asked-questions-faqs**. For more information contact Elizabeth Benham, NIST Metric Coordinator, at 301-975-3690 or at **TheSI@nist.gov**.

Best Practices on Reviewing QMS Documents

Byline: Micheal Hicks and Georgia Harris

This article notes five best practices and provides a sample list of likely items that OWM will review during the Quality Management System (QMS) assessments for evaluating compliance to the ISO/IEC 17025:2017 standard during the recognition review this year.

Keep in mind that OWM reviews and NVLAP (or any Accreditation Body) reviews are "sampling" exercises. It is up to the lab to evaluate and demonstrate compliance, regardless of whether a non-conformity is found or not (*i.e.*, assessments, by design, will normally not cover 100 % of QMS material). It is the lab's obligation to ensure 100 % compliance with the standard and not wait for assessment feedback! Since the QMS is being "sampled", think about what is most likely! For example, if you are taking a semester course that is 12 weeks long and 4 of the weeks are spent on ONE topic, it is highly likely that the final examination will pull heavily from that one topic!

Top Five Best Practices

1. Your Internal Audit is your best tool to ensure compliance!

The initial review of your laboratory documents using the internal audit is to make sure that you can find adequate references to all requirements in your quality manual and administrative procedures. This is called a "desk audit". It is simply making sure that your Quality Management System (QMS) complies with the ISO/IEC 17025:2017 standard. Failure to find a reference to the standard should result in identifying a non-conformity followed by documenting and completing corrective action(s). All corrective actions on laboratory documents should be fixed prior to the 2020 submission cycle! Putting a deadline for fixing corrective actions sometime in the future at this point means your lab is not currently compliant with the standard (or the deadline)!

The second step after a desk audit is to look for objective evidence of compliance. This is often called a functional audit. This means that you have a document that complies with the standard and that you are following it. OWM has covered internal audits many times. We have a webinar that covers this topic that many metrologists have attended. The topic of internal auditing and technical auditing has also been covered at the Regional Measurement Assurance Program sessions – the idea of a desk audit and a functional audit is not new! Yet, many internal audits were submitted in 2019 that only referenced documents, did not identify corrective actions, and had numerous examples of non-conformities within the Quality Manual (QM) or Standard Administrative Procedures (SAP), and failed to include objective evidence. There are two take-aways to this point: 1) make sure that your laboratory quality system review is complete and action items are documented and then completed; and 2) ensure that your internal audit is effective, includes the functional review, and includes objective evidence that shows the documents have been implemented (*i.e.*, don't just say it; show that you do it too).

2. Identify changes in the ISO/IEC 17025:2017 standard – and make sure those items are updated first!

Changes to the standard are most likely to be evaluated by OWM or by a third-party assessor like a customer or accreditation body. OWM has focused on changes to this standard for the past five years. We did our first training on it in 2016 while the document was still a final draft. There are several critical sources of information that can be used for identifying what changed from the prior version of the standard (2005). As one example, Titilayo Shodiya-Schneidewind (NVLAP) covered changes to ISO/IEC 17025:2017 extensively at the 2019 Combined RMAP. Her slides are in the notebook or on the USB stick participants received at that event. Second, the RMAP webinars on ISO/IEC 17025:2017 in 2020 covered highlights and gaps from prior OWM observations and provided recommendations on addressing new items. Slides were circulated to all participants. If you were not there or did not participate, ask OWM for the content.

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3. Make sure you fully cover this one area – we have covered it many times: RISK!

OWM began covering risk topics in the 2016 RMAP sessions. Two tools from those sessions are posted on the State Laboratory Program Resources page on the NIST OWM website (https://www.nist.gov/pml/weights-and-measures/laboratory-metrology/state-lab-program-resources). This includes a risk management matrix in Excel and a summarized list of potential risks. (None of them at the time included how you might address a pandemic or 100 % teleworking!) Responding to planned and unplanned events might well be a useful training topic in the future. In addition to these two tools, is the updated Management Review Outline that includes a new section on Risk. Even adding two sentences on risk to your management review about something you considered this year meets the requirements to discuss risk. There is no requirement for a "risk procedure" as a part of the standard. If you add one, that's fine, but it's not a requirement. The OWM feedback letters have been providing specific feedback on the incorporation of risk for several years now. There is no excuse for a gap in covering risk at this point.

4. Use one file for the Quality Manual and one file for the Standard Administrative Procedures if possible.

Being able to "search and replace" or "copy and paste" when working in laboratory documents is a useful tool. If your quality manual is in 17 to 20 extra pieces, you would have to do this multiple times. Same with the standard administrative procedures. Even making sure that footers and adoption dates are the same and consistent in all parts of the documents requires opening, editing, and saving each one. That's all lot of extra work with little value added. If you adopt all changes each year in one review, even if there are no changes, you can simply add one date to one file and speed up the review time and avoid potential inconsistencies in dates and/or formatting. Being able to search on all sections at one time can save you a lot of time. When you provide on-the-job training for a new staff member, you can have them open the quality manual and find a section of interest/need with just one search instead of opening all potentially related files. If you absolutely insist on multiple files for every section, be sure to include titles in the file names as these files will likely be reviewed more critically (fair warning, think "risk").

5. Reference information – don't repeat it!

Over the years, as changes have been made to the laboratory documents, a lot of repetition has crept in. In fact, if you have a standard administrative procedure for calibration certificates, and haven't updated it, it likely contains complete duplication of what WAS in SOP 1 (an earlier version). There is absolutely no need to completely repeat that information. Simplify! Delete all the duplicated text and reference SOP 1 within that procedure instead. Then, when SOP 1 is updated again, you already have that covered and it will save you even more time.

Top 10 Most Likely Items to be Sampled

1. Has risk language been updated?

As noted earlier: make sure you have included risk in your laboratory documents and management review.

2. Has the Standard Administrative Procedure on calibration certificates been updated to reference rather than repeat requirements from ISO/IEC 17025:2017 section 7.8 and SOP 1? Have all SAPs been updated and integrated?

During the 17025 sessions in the 2020 RMAP webinar sessions, the homework assignment was to review certificates. As noted earlier, make sure your administrative procedure is not repeating the requirements of the standard; instead, reference SOP 1. OWM will be looking for this! Additional SAPs should be reviewed to ensure that you are not duplicating procedures and can simplify your internal document requirements. Standard Administrative Procedures on 1) ensuring validity of measurements, can reference GLP 1; 2) software quality assurance, can reference GLP 15; 3) method validation, can reference GLP 14; 4) SAPs on corrective and preventive action can reference risk requirements rather than creating a new SAP (remember: preventive action is now considered risk assessment and mitigation); 5) supplier evaluation should be completed "prior to use" rather than "annually" or "periodically". Finally – make sure every SAP is referenced in your Quality Manual to ensure the administrative procedures are identified and integrated in your quality system and are not isolated documents.

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3. Have laboratory calibration certificate templates been updated to ensure compliance?

Extensive feedback was given to all participants on the calibration certificate homework from the 2020 webinar sessions. The primary action item from that homework would be to ensure all templates in the laboratory are updated for compliance. The feedback from the RMAP sessions is your objective evidence that certificates were reviewed. Take the opportunity to review the updated templates (or better yet, have staff who didn't participate in the activity review them), to ensure the updates are compliant with the standards.

4. Are all document references up to date with the latest versions?

One of the biggest gaps in quality manuals, references, and master lists that were submitted for review in 2019 were references to out of date documentary standards. Feedback was provided during the 2020 RMAP webinar sessions with several examples. The standard requires you to use the latest valid version of a standard (unless not possible for some reason). Supplements to the procedures can easily be added rather than "deviations" that require further validation. Some of the inconsistencies in documents were between the quality manual, document master list, and what gets put on calibration certificates. If the latest version of the Guide to the Expression of Uncertainty in Measurements is noted on your master list, make sure that is also what is referenced on your calibration certificate. If you don't actually use a document in your laboratory, it doesn't necessarily belong on your lists of references!

5. Do the QMS and laboratory documents address Conformity Assessment and Reciprocity – for legal metrology applications?

One of the requirements in the 2019 Handbook 143 is to address legal metrology requirements, most of which require conformity assessment. If your laboratory or weights and measures program accepts calibration certificates (this is reciprocal acceptance, not supplier evaluation) from other organizations or state laboratories, your program may need to ensure that the calibrated standards also comply with legal requirements. The current SOPs also note the evaluation of compliance with documentary standards and most note the decision rule requirements as well (which simplifies your life by being able to reference the documents rather than have a discussion with each customer as required by the standards). Make sure you have addressed this topic in your quality manual or program documents.

6. Has the QM addressed conflict of interest requirements?

Another new area of the standard is that of conflict of interest. Most programs can simply reference on-boarding training or employee manuals/handbooks to address this new requirement. But, make sure it is addressed in the quality manual. Your laboratory doesn't need a new procedure – reference the training and/or handbooks that are required for all staff.

7. Are the QM and SAPs adopted by current management with consistent "dates" throughout the document?

Simplify all the dates of adoption by having ONE date on the cover page that can be consistently implemented in the footer of the single document as noted before. Have a signature page with the appropriate laboratory management signing off on the document and dating it each year. Then include that same date throughout the document. Submitting an unsigned/undated document implies that it has not been implemented in practice. Again, this practice will save you time!

8. Do any of the QMS documents reference out of date or inappropriate laboratory records/files regarding facility, staff, equipment, etc.? Have all traceability essential elements been integrated into the QMS?

Look for past training requirements that are not valid for current staff. Evaluate any facility environmental requirements to ensure that they comply with current SOPs and reference documents. There are many outdated requirements noted in the current Quality Management System documents based on prior failures to update them when changes were published in updated documents. Make sure all traceability documents and records related to implementing traceability are up to date and integrated into your QMS. Adoption of GMP 11 and GMP 13 on the calibration program and traceability require up to date calibration status for all equipment and standards used in the laboratory. Do not leave open action items

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such as calibrations that are past the due date. Make sure everything on your Scope is addressed in your inventories of standards, calibration due dates and status, and traceability hierarchies. Follow procedures in GMP 11 if and when calibration due dates need to be extended (especially if due to COVID-19). Extending due dates must be based on technical analysis of data and not budgets/pandemic constraints; standard calibrations must be up to date or those services must stop. Remember, OWM issues a certificate of Recognition regarding metrological traceability. First and foremost, current calibrations of standards and traceability assessments must ensure all essential elements are in place and up to date.

9. Language of the standard – versus application in the laboratory.

When updating or writing the quality manual, be sure not to use verbs such as "shall" and "must". These are verbs used throughout requirement documents and indicate what the laboratory must do in order to be considered complaint. Instead, the quality manual should state what the laboratory does to comply with the requirements. "*The laboratory shall*…." statements are inappropriate in the quality manual.

10. Make sure they are polished! (Just say "no" to black dots!)

It's a good idea to perform a spell check and a grammar check on your laboratory documents. When files are submitted with things like traceability spelled wrong, it certainly makes the reader question the validity of measurement results. Customers rely on your laboratory to provide high quality measurement results. Make sure your laboratory documents reflect the same attention to detail and excellence! Have another person proof-read the documents before submitting to your management or to OWM. Also, check your file names for spelling errors!

Summary

The OWM Recognition Program is requiring all participating labs to be compliant with ISO/IEC 17025:2017 this year. OWM has been preparing labs for this transition for five years by providing training and feedback to labs on their progression to the new standard based on annual submission reviews. This newsletter outlines best practices for updating your QMS and primarily what OWM will be expecting and looking for in a compliant QMS. To allow for a smooth assessment via sampling of critical components, all metrology laboratories should submit a thoroughly done (1) internal audit, (2) address past year nonconformities, and (3) update references and terminologies in the QMS documents. Doing a good job with these items will give OWM great confidence in the laboratory QMS. If you have any questions regarding this Best Practice guide for reviewing QMS documents, please contact Mike Hicks at **Micheal.Hicks@nist.gov**.

OWM Joins NCWM Cannabis Task Group and ASTM D37 Providing Technical Assistance for Packaging and Labeling on Cannabis

Byline: Lisa Warfield

NCWM Chairman Mr. Hal Prince recently appointed Ms. Lisa Warfield (Technical Advisor to the NCWM Laws and Regulations Committee) to the NCWM Cannabis Task Group. Lisa will work with the Cannabis Task Group in its efforts to address packaging, labeling and method of sale issues involving packaged cannabis products. Lisa's participation on the NCWM Task Group will compliment her involvement with ASTM International Committee D37 on Cannabis. In 2017, ASTM D37 on Cannabis was formed to develop standards for cannabis and its products and processes. While ASTM D37 activities focus on the needs of the cannabis industry to address quality and safety through the development of voluntary consensus standards, their work also involves packaging, labeling, net quantity of content, and moisture loss requirements. These standards will need to reflect the requirements of NIST Handbook 130 "Uniform Laws and Regulations in the areas of Legal Metrology and Fuel Quality" Uniform Packaging and Labeling Regulation and the package requirements in NIST Handbook 133 "Checking the Net Contents of Packaged Goods." ASTM D37 is also developing a certification program to provide guidance to industry to ensure cannabis products meet legal and quality requirements. OWM's role will be assisting states and industry by developing webinars and training activities to promote national uniformity in packaging and labeling and net quantity of contents verification procedures cannabis products. For additional information on ASTM D37 Cannabis activities go to **www.astm.org/COMMITTEE/D37.htm** and on NCWM Cannabis Task Group go to **www.ncwm.com/lr-committee**. For additional information, contact Lisa at (301) 975-3308 or **lisa.warfield@nist.gov**.

2020 Metric Week Activities – Join the Celebration!

Byline: Elizabeth Benham

The NIST Metric Program and US Metric Association invite you to celebrate National Metric Week, October 4 to 10, 2020, an annual event that occurs during the week containing the tenth day of the tenth month. Celebrate the 7 SI base units with 7 days of measurement fun and the NIST Guardians of the SI Superheroes!

SUNDAY - Chart your Metric Week plan!

Share your organization's plans with your community. Review and expand the SI education resources available on your website. Tag @nist and use the hashtag #MetricWeek on related social media posts. Free US Metric Association social media resources are available (**usma.org/metric-week-social-media-toolkit)**. Enjoy *Running Out of Time*, an animated video featuring the SI Superheroes race to keep the world's satellite navigation system "on time" (**youtu.be/FP86qG1bjMY**).

MONDAY - Share SI education resources with local K-12 Educators.

Explain how to request a free NIST SI Teacher Kit (**www.nist.gov/pml/weights-and-measures/education-resources-metric-system-si**). View *Mass Hysteria*, where Monsieur Kilogram is kidnapped by the nefarious Major Uncertainty, putting the world's measurements of mass in jeopardy (**youtu.be/7Hy-xCzWg6k**). Make a DIY Lego Kibble Balance (**www.nist.gov/si-redefinition/kilogram/nist-do-it-yourself-kibble-balance**).

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2020 Metric Week Activities – Join the Celebration!

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TUESDAY - Build SI understanding.

Practice "powers of 10" thinking. Watch the classic 1977 video (**www.eamesoffice.com/the-work/powers-of-ten/**). Construct a 1 liter cube and estimate the length, area, and volume of household items (**www.vendian.org/mncharity/dir3/dm_box/**). Download, print, and display the updated NIST SI Relationships poster in your home office or workspace (**doi.org/10.6028/NIST.SP.1247**).

WEDNESDAY - Host a live stream "lunch and learn" session.

Demonstrate how to use metric ruler. Challenge your friends to a virtual "Mini-Metric Olympics" (**www.nclark.net/mini-metrics.pdf**). Share the benefits of SI professional development and how to become a Certified Metrication Specialist (CMS) (**usma.org/usmas-certified-metrication-specialist-cms-program**). Explain how to use common SI prefixes to easily change the magnitude of a quantity (**www.nist.gov/pml/weights-and-measures/metric-si-prefixes**).

THURSDAY - Develop SI knowledge!

Play a five question rounds of the NIST Metric Trivia Quiz using your Amazon Alexa voice personal assistant (**www.nist.gov/quiz/nist-metric-trivia-quiz**). Students are beginning to prepare for upcoming state and national science fairs. Learn more about the USMA Science Fair Awards Program and the free science fair judging guide (**usma.org/judging-for-the-usma-science-fair-awards-program**). Explore the 7 defining constants that form the basis of all SI units (**www.nist.gov/si-redefinition/meet-constants**).

FRIDAY - Become a SI Champion!

Discover how *Going Metric Pays Off* for U.S. industry (**usma.org/going-metric-pays-off**). Share the USMA/Blake Family Foundation Metric Award information with a local high school senior or metric system champion who's promoting SI use in their community (**usma.org/usma-blake-family-foundation-metric-awards**). Share photos of Metric Week activities on social media (@nist) with the hashtag #MetricWeek.

SATURDAY - Spend time with family!

Bake a batch of delicious Metric Chocolate Chip Cookies (**www.nist.gov/pml/weights-and-measures/metric-chocolate-chip-cookies**). Enjoy watching the SI Superheroes use their measurement powers in *Desperate Measures* to help a stranded soccer player get home (**youtu.be/5ZHpOojFtH8**). Spark your creativity with the SI Superheroes coloring pages (**www.nist.gov/kids/measurement-league/coloring-pages**). Envision a SI Superheroes inspired Halloween costume!

Calendar of Events

OWM Webinar Events

Date	Time (Eastern Time Zone)	Event Name	Class
October 1, 2020 October 8, 2020 October 20, 2020 November 17, 2020 December 8, 2020	1:00 p.m. to 3:30 p.m. 1:00 p.m. to 3:30 p.m. 11:00 a.m. to 1:30 p.m. 12:00 p.m. to 2:30 p.m. 11:00 a.m. to 1:30 p.m.	Weights and Measures Inspections - Evidence, Search and Seizure, and Due Process	5685 5686 5687 5693 5699
October 5, 2020 and October 7, 2020	12:00 p.m. to 4:00 p.m.	Fundamentals and LAP Problems Preparation (Week 4)	5673
October 6 to 8, 2020	9:00 a.m. to 11:00 a.m.	MidAmerica Measurement Assurance Program (MidMAP)	5627
October 8, 2020 October 21, 2020 November 18, 2020 December 9, 2020	10:00 a.m. to 12:00 p.m. 11:00 a.m. to 1:00 p.m. 12:00 p.m. to 2:00 p.m. 11:00 a.m. to 1:00 p.m.	NIST Handbook 133 - How to Test Animal Bedding	5688 5689 5694 5700
October 14, 2020 December 1, 2020	1:00 p.m. to 3:00 p.m. 11:00 a.m. to 1:00 p.m.	NIST Handbook 130 - Examination Procedure for Price Verification	5690 5696
October 14, 2020 December 1, 2020	4:00 p.m. to 6:00 p.m. 2:00 p.m. to 4:00 p.m.	NIST Handbook 130 - Overview of the Uniform Packaging and Labeling Regulation	5691 5697
October 15, 2020	4:00 p.m. to 6:30 p.m.	NIST Handbook 133 - Overview of Handbook 133	5692
October 21, 2020	2:00 p.m. to 3:30 p.m.	Measurement System Basics: SI & US Customary Units for Regulator Officials	5668
December 2, 2020	11:00 a.m. to 1:00 p.m.	NIST Handbook 133 - Checking the Net Contents of Packaged Goods - Overview	5698
January 12, 2021 to February 4, 2021	12:00 p.m. to 4:00 p.m.	Fundamentals and LAP Problems Preparation	5674

Shown are OWM webinar events as of October 1, 2020. Please refer to the OWM website for the most recent listing ***www.nist.gov/pml/weights-and-measures/about-owm/calendar-events****.*

*To request training, visit the OWM Contacts System (****tsapps.nist.gov/WMD****).*

Calendar of Events

Meetings

NCWM and Regional Associations		
September 28 to 30, 2020 (online)	Western Weights and Measures Association (WWMA)	**westernwma.org**
October 4 to 7, 2020 (online)	Southern Weights and Measures Association (SWMA)	**www.swma.org**
October 26 to 28, 2020 (online)	Central Weights and Measures Association (CWMA)	**cwma.net**
October 13 to 15, 2020 (online)	Northeastern Weights and Measures Association (NEWMA)	**newma.us**
January 10 to 12, 2021, St. Pete Beach, FL	NCWM Annual Meeting (Conclusion)	**www.ncwm.com**
January 13 to 15, 2021, St. Pete Beach, FL	NCWM Interim Meeting	**www.ncwm.com**
July 18 to 22, 2021, Rochester, NY	NCWM Annual Meeting	**www.ncwm.com**
September 2021, Golden, CO	Western Weights and Measures Association (WWMA)	**westernwma.org**
January 7 to 12, 2022, Tampa, FL	NCWM Interim Meeting	**www.ncwm.com**
OIML		
October 20 to 22, 2020 (online)	55th CIML Meeting	**www.oiml.org/en**

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