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Device Inspection - Where to Find Help

By Rick Harshman

A proper device examination is one in which all applicable NIST Handbook 44 (HB-44) requirements have been properly applied. Approval of a commercial weighing or measuring device is appropriate only when it has been determined through complete and proper examination that the device conforms to all applicable HB-44 requirements. This includes not only compliance with accuracy or performance requirements, but also design, maintenance, and user requirements. The importance of verifying that weights and measures equipment comply with all applicable HB-44 requirements is imperative, as is knowing the resources available to gain knowledge on the correct interpretation and application of HB-44 requirements.

Why is it that many field officials tend to place a greater emphasis on verifying the performance and accuracy of devices (i.e., making certain they have followed proper testing procedures and correctly applied applicable tolerances) than on the inspection of devices (i.e., verifying compliance with design, maintenance, and user requirements)? Although device accuracy is an extremely critical factor in the final establishment of accurate weighing or measuring results, it is of no greater importance, in that regard, than is proper design, maintenance, and use of a device. After all, final measurement results are affected by more than device accuracy alone. Any number of deficiencies relating to device design, maintenance, and use can also affect final results. Thus, placing a greater emphasis on testing versus inspection of devices is unacceptable. It is only through complete and accurate application of all applicable requirements that the "purpose" of HB-44 technical requirements can properly be achieved.

<p>The purpose of these technical requirements is to eliminate from use, weights and measures and weighing and measuring devices that give readings that are false, that are of such construction that they are faulty (that is, that are not reasonably permanent in their adjustment or will not repeat their indications correctly), or that facilitate the perpetration of fraud, without prejudice to apparatus that conforms as closely as practicable to the official standards.</p>

Purpose of HB-44 Technical Requirements

(Excerpt from the Introduction of HB-44)

Weights and measures administrators and field officials alike share a key responsibility of ensuring that all applicable HB-44 requirements are applied and are applied correctly. The consequences of failing to take this responsibility seriously can be severe, especially if unfair enforcement actions are taken based upon examination results that are either unreliable or incomplete. Also, if deficiencies are going unnoticed, they have the potential of resulting in extreme financial loss (or gain) to the device owner or his/her customers. What steps can field officials take to help ensure they are conducting complete device examinations? What resources are available to help field officials gain

the knowledge necessary to enable them to apply all requirements and test procedures properly? What actions can administrators take to best support field officials in their efforts?

Field officials must possess a thorough understanding of all requirements and test procedures applicable to each device type they will be examining to enable them to apply those requirements and test procedures properly. They must also be familiar with the correct operation of the devices they examine, including the purpose and function of any operational controls or features that may exist on those devices. Service personnel, too, must have knowledge of applicable requirements to enable them to correctly service equipment so that it complies with applicable requirements. There are plenty of resources available to help field officials and service personnel gain the necessary knowledge in this regard. The following bulleted list describes many of the resources made available by NIST:

NIST Examination Procedure Outlines (EPO's): NIST WMD has developed EPOs for most of the more common device types to make it easy for field officials to ensure they are conducting complete device examinations. Each outline describes the minimum examination preceding official action and is not intended to preclude officials from conducting additional testing or repeating tests as part of the examination process should the inspector determine additional testing is warranted. Thus, by consulting the appropriate EPO corresponding to the device being examined, and applying all of the requirements outlined, field officials can be assured they have performed a minimum acceptable examination. They may also repeat tests or conduct additional tests as needed. It is important to note that the EPO's are intended to reference every HB-44 requirement that could possibly apply to a particular device type used under any application. However, since some operational features of a device may be dependent upon a particular application, all requirements referenced in an EPO may not apply to every device of the type being examined. Service companies may also find the EPOs of use in identifying those tests and criteria that will be applied by the weights and measures official.

Note: Although NIST Handbook 112 (HB-112) contains all of the EPOs that WMD had developed as of 2002, WMD has since developed EPOs for some additional device types, which are not included in HB-112. Additionally, many of the EPOs that are in HB-112 have recently been updated by WMD to reference requirements contained in the 2007 edition of HB-44. For this reason, it is recommended that anyone seeking the most current version of an EPO contact WMD. Once WMD has completed the updates to all of the EPOs, they will be made available on WMD's website.

- ***NIST Training Seminars:*** Members of WMD's Legal Metrology Devices Group (LMDG) routinely present training seminars to officials and service personnel on proper device examination. The specific types of devices covered and the locations of these seminars are based upon the training needs of the various states, in particular, those states whose state director responds to WMD's annual request for input on training needs. Seminar duration typically ranges from approximately one to five days depending upon the topic and the degree of instruction requested. Topics and locations of upcoming

NIST training seminars are listed regularly in this newsletter (i.e., *Weights & Measures Quarterly* newsletter) under the heading “Calendar of Events.” Many of the presentations and much of the course material from recently completed NIST training seminars is currently available online. To access this information, go to the NIST WMD website at www.nist.gov/owm and click on “NIST/Weights and Measures Training.” Then select the appropriate “interface link” to access the desired training module.

- ***Inspector Manuals:*** Inspector manuals provide detailed information regarding the history, purpose, and application of HB-44 requirements as they relate to the particular device type for which the manual applies. These manuals also provide information about the design, application, and use of the device. These manuals are extremely useful in determining correct interpretations and applications of HB-44 requirements as they relate to a particular type of device. Each manual is subdivided into several chapters allowing information to be located quickly and easily. Inspector manuals have been developed for many different device types. Some are currently available online and included in the course material currently offered on the “NIST/Weights and Measures Training” page of WMD’s website. To access the manuals available online, click on the appropriate “interface” button from the “NIST/Weights and Measures Training” page for the device type desired. Then download the chapters needed by selecting the “PDF” or “Word” format. To inquire about other Inspector manuals not available online, contact WMD’s Rick Harshman using the contact information provided at the end of this article.

- ***Weights & Measures Quarterly Newsletter:*** Members of the LMDG regularly write technical articles relating to proper device examination, which are often featured in WMD’s *Weights & Measures Quarterly* newsletter. Many of these articles list and explain proper procedures to be used, provide correct interpretations of HB-44 requirements, and offer other relevant information a field official would need to know to perform a proper device examination. Information in these articles can also be of use to weights and measures administrators in understanding the resources and information required by the field official. Likewise, service companies can gain benefit from this information because it provides better understanding of the requirements and test procedures officials should be applying to equipment in the field. An index of these technical articles by device type is available on WMD’s website to enable users to easily locate related articles appearing in previous editions of this newsletter. To access the index, go to WMD’s homepage and click on “Weights and Measures Quarterly Newsletter Archive” listed under the heading “Publications.”

- ***Annual Reports of the National Conference on Weights and Measures (NCWM):*** The annual reports of the Committee on Specifications and Tolerances (S&T Committee) provide background information and related discussions on proposed changes to NIST HB-44. This information is of great benefit when trying to establish the intended application or a correct interpretation of an existing HB-44 requirement. Each Annual Report of the NCWM is published by NIST as a Special Publication. The Annual Reports of all of the National Conferences on Weights and Measures (i.e., from 1905 – 2006) have been incorporated onto a single DVD made available by NIST. This DVD

includes a search feature allowing information to be searched in a variety of different ways.

- **Field Manuals:** Field manuals are intended to provide more information and instruction than is currently available in the EPOs, yet not so much information as to diminish their usefulness as a tool for field officials. Though not posted on the WMD website, a few older field manuals including NBS Handbook 137, Examination of distance measuring devices, and NBS Handbook 117, Examination of vapor-measuring devices for liquefied petroleum gas are available. Members of the LMDG are in the process of developing additional field manuals for vehicle scales, belt-conveyor scales, and grain moisture meters.

- **Technical Support from NIST Staff:** WMD’s staff of “technical experts” is available Monday through Friday, 8:30 a.m. to 5:00 p.m. (ET) to answer questions and provide technical assistance encompassing a broad range of weights and measures issues. WMD is organized into four program areas as follows: State Laboratory Program, Device Technology Program, Laws and Metric Program, and the International Legal Metrology Program. It is recommended that inquiries relating to device inspection and HB-44 issues be directed to an appropriate expert in the LMDG, which is considered part of the Device Technology Program. A list of each LMDG member’s technical responsibilities related to device inspection is included in the table below. To talk with an expert, contact WMD at (301) 975-4004.

NIST Weights and Measures Division Legal Metrology Devices Group		
Type of Information	Who to Contact	Telephone 301-975 + ext
<u>Publications</u> NIST Handbook 44, <i>Specifications, Tolerances and Other Technical Requirements for Weighing and Measuring Devices</i>	Tina Butcher, Steve Cook, Rick Harshman, Diane Lee Richard Suiter, Juana Williams	2196, 4003, 8107, 4405, 4406, 3989
<u>Measuring Devices</u> Loading-Rack Meters LPG Meters Mass Flow Meters Retail Motor-Fuel Dispensers (Gas Pumps) Vehicle-Tank Meters General Metering Devices	Richard Suiter Tina Butcher Juana Williams	4406 2196 3989

NIST Weights and Measures Division Legal Metrology Devices Group		
Type of Information	Who to Contact	Telephone 301-975 + ext
<u>Weighing Devices</u>		
Automatic Weighing Systems		
Belt-Conveyor Scales	Steve Cook	4003
General Weighing Devices	Juana Williams	3989
Vehicle & Railroad Track Scales	Rick Harshman	8107
In-Motion Scales		
Load Cells		
<u>Other Devices</u>		
Animal Carcass Measuring Devices	Richard Suiter	4406
Grain Moisture Meters & NIR Protein Analyzers		
OIML R 59 Grain Moisture Meters	Diane Lee	4405
OIML TC 17/SC 8 Grain Protein Measuring		
Multiple Dimension Measuring Devices	Richard Suiter, Tina Butcher	4406, 2196
Taximeters and Odometers		
OIML R 21 Taximeters	Juana Williams	3989

Note: WMD is currently in the process of reorganizing its website. Updated instructions for accessing the information below will be provided in a future edition of the newsletter once the reorganization is complete.

In addition to the resources made available by NIST, a number of state and local weights and measures agencies also offer periodic training schools or seminars on device inspection. Besides covering basic device inspection, this training is often offered to keep officials up-to-date on new requirements being added or changes made to existing requirements in HB-44 and new developments in device technology. Training is also made available on occasion from equipment manufacturers, who often welcome the opportunity for weights and measures officials to participate in training they extend to their own employees or those involved with the distribution or service of their equipment. This training provides an excellent opportunity for field officials to learn the many operational features of new equipment and how that equipment complies with legal requirements.

Field officials need to know their efforts are being supported by their superiors. Therefore, it is not only important for weights and measures administrators to communicate their desire for field officials to conduct complete and accurate device examinations, but it is also just as important that administrators continually demonstrate, through their actions, that they are genuinely committed to achieving this goal. There are many ways this commitment can and should be demonstrated. Below are some examples of actions that can be taken by administrators to help demonstrate this commitment:

- Provide regular opportunities for field officials to participate in training designed to increase their knowledge of HB-44 requirements and the test procedures that apply to the various devices for which they are responsible for examining.
- Make available to field officials all necessary reference material (e.g., EPOs, inspector manuals, access to technical newsletter articles, etc.).
- Allow sufficient time for field officials to conduct complete and accurate device examinations. As officials gain experience in performing complete and accurate examinations, their speed can be expected to increase, thus reducing the amount of time it takes to perform complete examinations.
- Monitor the inspection activities of field officials to ensure examinations are complete and accurate. Provide additional guidance and training as needed to achieve the goal that was communicated.
- Ensuring that all applicable HB-44 requirements and test procedures are applied properly to commercial weighing and measuring devices is a shared responsibility of administrators and field officials that can only be achieved when they are committed to working together for the common good. As detailed in this article, there are plenty of resources available to help them achieve this end. For more information regarding how to obtain any of the resources mentioned in this article contact Rick Harshman at 301-975-8107 or by email at richard.harshman@nist.gov.