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**NATIONAL CONFERENCE  
ON WEIGHTS AND MEASURES****100<sup>TH</sup> ANNUAL MEETING****JULY 19 - 23 , 2015****PHILADELPHIA, PENNSYLVANIA**

This milestone meeting will be taking place in historic Philadelphia. Plan to bring your family to tour this remarkable historical city. Visit the Liberty Bell, Independence Hall, and the many other historical sites in the area.

Registration and lodging information for the July meeting is available online at:  
[https://www.ncwm.net/sems/event\\_detail/2015\\_annual\\_pa](https://www.ncwm.net/sems/event_detail/2015_annual_pa).

The meeting schedule, supporting documents, and hotel information are also available at this website location.

**Let Your Voice Be Heard!****OFFICE OF WEIGHTS AND  
MEASURES**

**General Inquiries:** (301) 975-4004; e-mail:  
owm@nist.gov

**Office Chief, Carol Hockert:** e-mail:  
carol.hockert@nist.gov

**Newsletter Editor:** Linda Crown; (301) 975-3998; e-mail: linda.crown@nist.gov

**Draining Test Measures  
and Provers***Byline: G. Diane Lee*

I often think about the amount of money spent on gasoline per year just to get to and from work. Like many, I travel a considerable distance to work, which accounts for a lot of gas and money per year. It is reassuring to know that I can rely on the work of weights and measures officials who inspect and test gasoline dispensers to ensure accurate measurements. Throughout the United States, thousands of volume standards are calibrated in weights and measures laboratories every year. Weights and measures inspectors then use these standards to test gasoline dispensers to provide consumers assurance that they are getting what they pay for at the pump. These tests also protect device owners and ensure device owners are receiving fair payment. The accuracy of these tests depends on the inspector following the correct test procedures. One very important procedure in the testing of gasoline dispensers is that of draining test measures and provers. Incorrectly draining a test measure or prover can contribute a considerable amount of error in testing. This article reviews the correct procedures for draining five-gallon test measures and bottom-drain provers; answers frequently asked questions concerning these procedures; and provides information on additional training tools available on this topic.

**PROCEDURES FOR DRAINING TEST MEASURES AND PROVERS**

NIST Handbook 44 "Specifications, Tolerances, and Other Technical Requirements for Weighing and Measuring Devices" Section 3.30. Liquid Measuring Devices, paragraphs N.4.4.1. and N.4.4.2. addresses the procedures for draining test measures and provers.

**N.4.4.1. Pour and Drain Times for Hand-held Test Measures.** – Hand-held test measures require a 30 second ( $\pm 5$  seconds) pour followed by a 10 second drain with the measure held at a 10 degree to 15 degree angle from vertical.

**N.4.4.2. Drain Times for Bottom Drain Test Measures or Provers.** – Bottom drain field standard provers require a 30 second drain time after main flow cessation.

When draining a hand-held test measure you must pour the product back to storage by first touching the neck of the test measure to the neck of a

metal funnel. A plastic funnel may cause a static electric charge, and must not be used to return product back to storage. The contents must be poured slow enough so that the main flow stops after 30 seconds  $\pm$  5 seconds. Then, the remaining liquid is drained for 10 seconds at a 10 degree to 15 degree angle from vertical.

When draining a five-gallon truck mounted prover, the truck is typically grounded to the dispenser before testing begins. Some jurisdictions also ground the prover to the storage tank on the truck. You should check with your organization's safety officer or other expert to ensure that equipment is properly grounded. The release valve on the prover is opened and the product is drained from the prover to the storage tank below. Observe the sight glass as the liquid drains from the prover. After the main flow stops, the remaining liquid is allowed to drain for 30 seconds and the valve is closed.

Although these procedures may not seem difficult to a more seasoned inspector, no matter what your experience level, the following frequently asked questions may provide new information or confirm or enhance your existing knowledge of draining test measures and provers.

**Frequently Asked Questions:**

**What is a test measure? What is a prover?**

Both a test measure and prover are volumetric standards used to test gasoline dispensers and other liquid measuring devices. Requirements for these field standards are included in NIST 105-3, "Specifications and Tolerances for Graduated Neck-Type Volumetric Field Standards."

"Test measures" are small, hand-held volumetric measures that are typically 20 L (5 gal) or smaller in size. See Figure 1 - Test Measure.

"Provers" are bottom-drain volumetric measures and may be free standing or permanently mounted on a truck, platform, or trailer that are typically 20 L (5 gal) or larger. See Figure 2 - Prover.

## Training and Events Calendar 2015

Registration for training in the NIST Office of Weights and Measures is handled by Yvonne Branden at [yvonne.branden@nist.gov](mailto:yvonne.branden@nist.gov).

Course descriptions can be viewed on the Office of Weights and Measures website at <http://www.nist.gov/pml/wmd/calendar.cfm> and clicking on the name of the course.

April 1 (2 hr)  
Webinar - NISTIR 6969, SOP 8, Part 1  
2:00 p.m. - 4:00 p.m.  
Class No. 5364

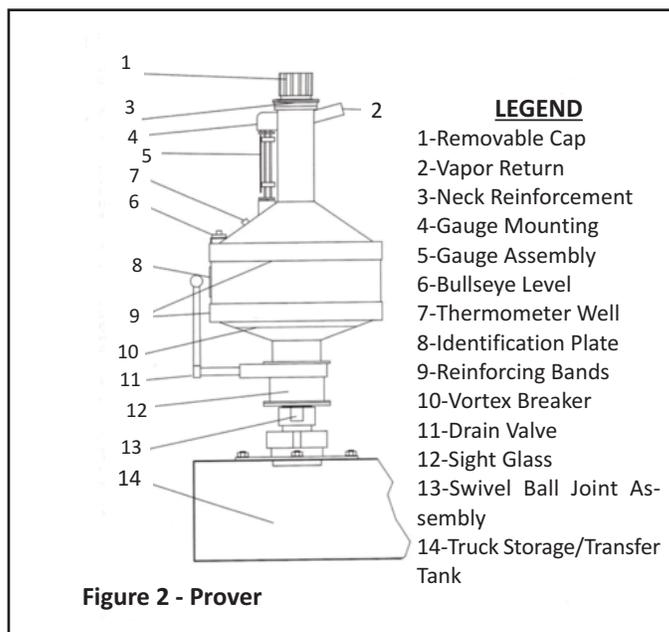
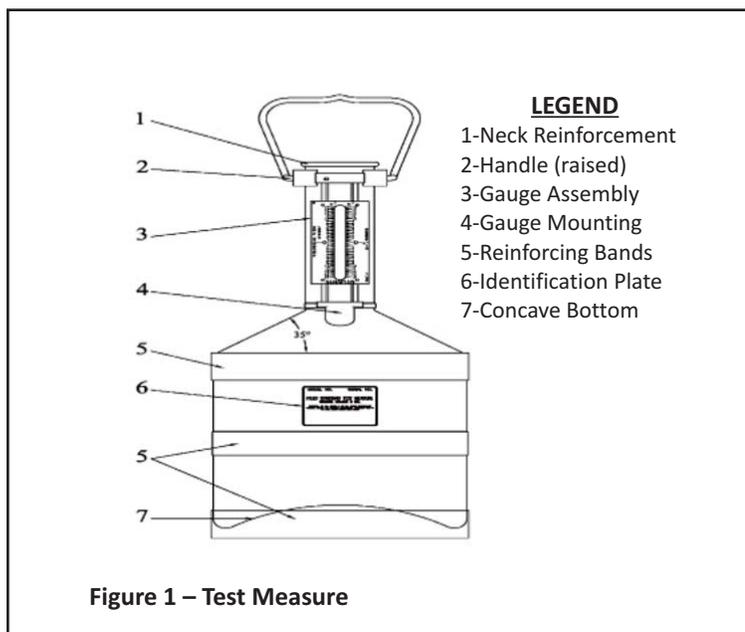
April 2 (2 hr)  
Webinar - NISTIR 6969, SOP 8, Part 2  
2:00 p.m. - 4:00 p.m.  
Class No. 5365

April 8 (2 hr)  
Webinar - NISTIR 7383, SOP 19 (18) Part 1  
2:00 p.m. - 4:00 p.m.  
Class No. 5366

April 9 (2 hr)  
Webinar - NISTIR 7383, SOP 19 (18) Part 2  
2:00 p.m. - 4:00 p.m.  
Class No. 5367

April 13 - 17 (5 days)  
Handbook 133, "Checking the Net Contents of Packaged Goods," Basic  
Class No. 5362  
Indianapolis, IN

*(continued pg 3)*



### **Why is it important to follow proper drain procedures?**

When liquid is drained from a test measure or prover, a residual amount of liquid will remain clinging to the walls. It is impractical to dry the inside of the test standard between uses; thus, when a standard is calibrated, it is calibrated “to deliver” its content. A “to deliver” calibration means that the standard is calibrated to compensate for this clingage so that tests can be run one after another without having to take time out to thoroughly dry the standard before each test. Using proper drain procedures ensures that each time you perform an accuracy test on a gasoline dispenser, you start with the same amount of liquid clinging to the inside of the standard between each test and helps to ensure accurate measurements from test to test.

If the inside of a standard is dry, the standard must be wet down (e.g. fill the standard to capacity and follow the draining procedures in this article) before using it to test gasoline dispensers. During periods of non-use, such as, driving from one location to another location for testing or breaking for lunch while testing at one location, care must be taken to ensure that testing resumes with a standard that has been properly wet down.

### **When draining a test measure, how do I hold the test measure at a 10 to 15 degree angle?**

One way to determine if you are holding the test measure at a 10 degree to 15 degree angle from vertical when draining it is to think of the arm that you use to hold the handle of the test measure as your vertical line (a line that extends up and down) (See Figure 3). This arm makes a 90 degree angle with the ground (See figure 3 and 4). Holding the bottom of the test measure with your other hand, adjust the test measure to the 10 degree to 15 degree angle from vertical as shown in Figures 3 and 5.

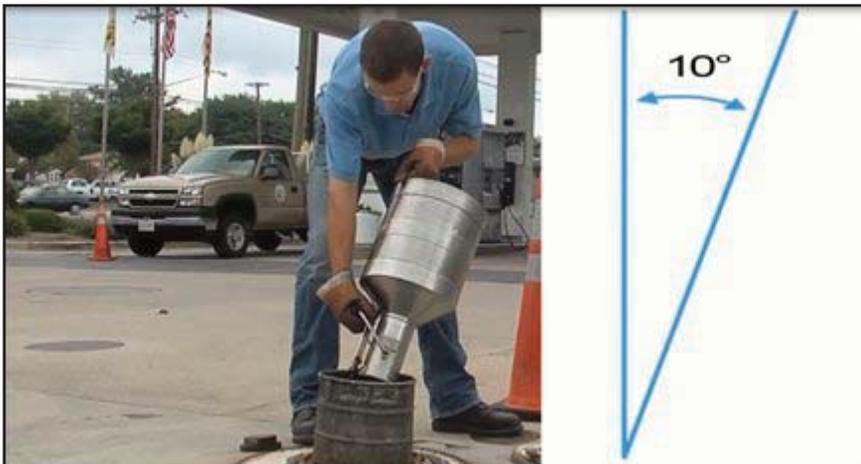


Figure 3 – Inspector Draining a Test Measure at a 10 Degree to 15 Degree Angle.

## **The Office of Weights and Measures**

will gladly include your weights and measures related events in our calendar.

Contact the Editor: [Linda.Crown@nist.gov](mailto:Linda.Crown@nist.gov)

April 13 - 16 (4 days)  
SEMAPP\*\*  
Class No. 5357  
Tallahassee, FL

April 14 - 16 (3 days)  
Train the Trainer  
Class No. 5353  
NIST/Gaithersburg, MD

April 20 - May 1 (10 days)  
Mass Metrology Seminar  
Class No. 5374  
NIST/Gaithersburg, MD

May 4 - 7 (4 days)  
WRAP\*\*  
Class No. 5358  
Olympia, WA

May 4 - 8 (5 days)  
Northeast Weights and Measures Association (NEWMA) Annual Meeting  
Saratoga Springs, NY  
Contact: James Cassidy,  
[jcassidy@cambridgema.gov](mailto:jcassidy@cambridgema.gov)

May 12 - 13 (2 days)  
Multiple Dimension Measuring Device Work Group Meeting  
Reynoldsburg, OH  
Information at:  
<https://www.ncwm.net/meetings/ntep/mdmd>

May 18 - 22 (5 days)  
Central Weights and Measures Association (CWMA) Annual Meeting  
Columbus, OH  
Contact: Sherry Turvey,  
[sherry.turvey@kda.ks.gov](mailto:sherry.turvey@kda.ks.gov)

June 1 - 5 (5 days)  
Handbook 133, “Checking the Net Contents of Packaged Goods,” Basic  
Class No. 5345  
Indianapolis, IN

June 1 - 5 (5 days)  
Liquefied Petroleum Gas Liquid-Measuring Devices  
Class No. 5375  
Madison, WI

June 1 - 11 (9 days)  
Advanced Mass Seminar (Rev 2015)  
Class No. 5349  
NIST/Gaithersburg, MD

July 19 - 23 (5 days)  
National Conference on Weights and Measures (NCWM) Annual Meeting  
Philadelphia, PA  
Contact: [info@ncwm.net](mailto:info@ncwm.net)

July 19 - 23 (5 days)  
NCSL International Conference 2015  
Metrology and the Quality of Life  
Grapevine, TX  
Information: [www.ncsli.org](http://www.ncsli.org)

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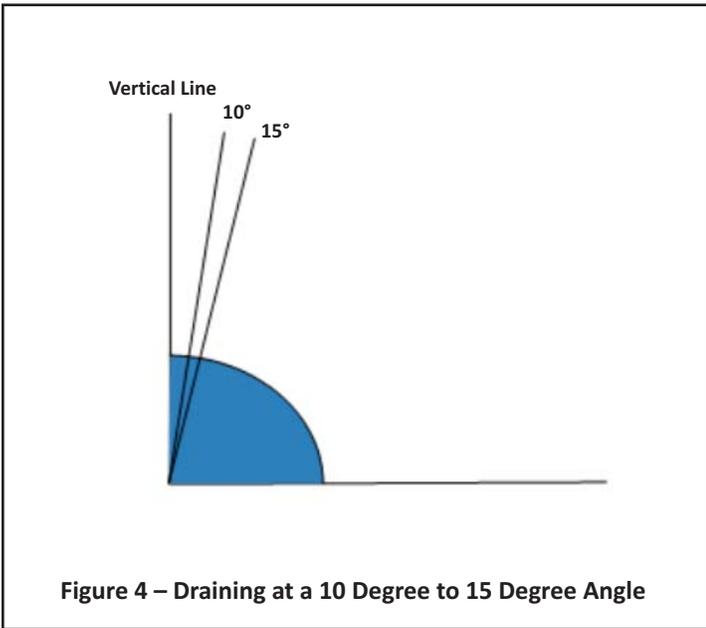


Figure 4 – Draining at a 10 Degree to 15 Degree Angle

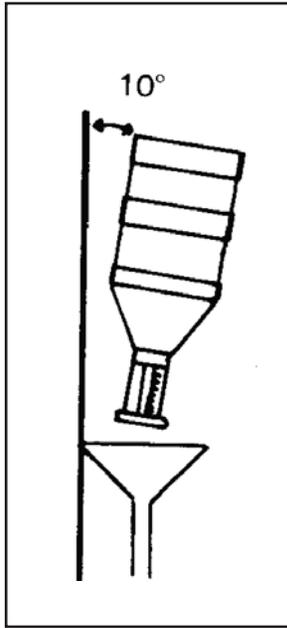


Figure 5 – Test Measure at a 10 Degree Angle

**How do I correctly measure the drain times for test measures and provers?**

When draining test measures or provers, inspectors must use a stop watch or other timing device with a second indicator to determine the correct drain time.

Test measures must be emptied by pouring the contents slowly enough that the main flow stops after 30 seconds and then drained for 10 seconds at a 10 degree to 15 degree angle. While it may be difficult to look at a stop watch or watch with a second hand or digital indicator while pouring the contents of the test measure, an option is to wear the stop watch around the neck and periodically look down at the stopwatch to determine if you need to adjust the timing of your pour. A watch with a second hand or indicator worn on the arm used to hold the handle of the test measure could also be used. Turn the watch so that you can see the second hand or indicator as you pour and then drain liquid from the test measure.

On a bottom-drain prover, open the drain valve with one hand and hold the timing device in the other hand. After the main flow stops, begin timing the drain for 30 seconds. See Figure 6 - Inspector draining a prover.



Figure 6 – Inspector Draining a Prover

- August 10 - 14 (5 days)  
Fundamentals of Metrology  
Class No. 5373  
NIST/Gaithersburg, MD
- August 13 (2 hr)  
Webinar - Contract Review  
2:00 p.m. - 4:00 p.m.  
Class No. 5334
- August 17 -21 (5 days)  
Volume Metrology Seminar  
Class No. 5356  
NIST/Gaithersburg, MD
- August 19 - 20 (2 days)  
NTEP Grain Analyzer Sector Meeting  
Live Web Meeting  
Details unavailable at this time.  
Information to be posted at:  
<https://www.ncwm.net/ntep/sectors/grain-analyzer/registration>
- August 25 - 26 (2 days)  
Weighing Sector Meeting  
Denver, CO  
Information at:  
[http://www.ncwm.net/sems/event\\_detail/2015\\_weighing](http://www.ncwm.net/sems/event_detail/2015_weighing)
- August 27 (2 hr)  
Webinar - Document Control and Record Keeping  
2:00 p.m. - 4:00 p.m.  
Class No. 5335
- September 14 - 17 (4 days)  
NEMAP\*\*  
Class No. 5359  
Needham, MA
- September 15 - 16 (2 days)  
NTEP Measuring Sector Meeting  
Denver, CO  
Information at:  
<http://www.ncwm.net/meetings/ntep/measuring>  
*(continued pg 5)*

## Training Tools

The NIST, Office of Weights and Measures (OWM) provides other training tools on draining test measures and provers. You may visit the weights and measures contacts system at <https://tsapps.nist.gov/WMD/default.aspx> to locate webinars being provided on this topic. Additionally, a retail motor fuel dispenser inspection video and shorter videos including this topic are available on our website at <http://www.nist.gov/pml/wmd/>.

Incorrectly draining a test measure or prover can contribute a considerable amount of error in testing. Following the test procedures in this article will help to ensure that accurate test results are obtained when testing gasoline dispensers and help to ensure accurate commercial measurement transactions.

For additional information on draining test measures and provers, contact Diane Lee at (301) 975-4405.

September 16 - 17 (2 days)  
NTEP Software Sector Meeting  
Denver, CO  
Information at:  
<http://www.ncwm.net/meetings/ntep/software>

September 24 (2 hr) (tentative)  
Webinar - State Laboratory Annual Submission Process\*\*  
2:00 p.m. - 4:00 p.m.  
Class No. 5355

September 27 - October 1 (5 days)  
Western Weights and Measures Association (WWMA) Annual Meeting  
Boise, ID  
Contact: Jerry Buendel,  
[jbuendel@agr.wa.gov](mailto:jbuendel@agr.wa.gov)

September 28 - October 1 (4 days)  
SWAP\*\*  
Class No. 5360  
Columbia or Jefferson City, MO

October 5 - 7  
Central Weights and Measures Association (CWMA) Interim Meeting  
St. Charles, MO  
Contact: Sherry Turvey,  
[sherry.turvey@kda.ks.gov](mailto:sherry.turvey@kda.ks.gov)

October 5 - 8 (4 days)  
MidMAP\*\*  
Class No. 5361  
Madison, WI

October 19 - 23 (5 days) (tentative)  
CaMAP\*\*  
Class No. 5372  
San Juan, PR

October 22 (2 hr)  
Webinar - Internal Auditing Best Practices  
2:00 p.m. - 4:00 p.m.  
Class No. 5339

October 26 - November 6 (2 weeks) (tentative)  
Mass Metrology Seminar  
Class No. 5340  
NIST/Gaithersburg, MD

## 2016

January 9 - 14  
National Conference on Weights and Measures (NCWM) Interim Meeting  
San Diego, CA  
Information at:  
[http://www.ncwm.net/sems/event\\_detail/2016-interim-meeting](http://www.ncwm.net/sems/event_detail/2016-interim-meeting)

February 11 (2 hr) (tentative)  
Webinar - Conducting an Effective Management Review  
2:00 p.m. - 4:00 p.m.  
Class No. 5336

March 3 (2 hr)  
Webinar - Internal Auditing Best Practices  
2:00 p.m. - 4:00 p.m.  
Class No. 5337

\*Invitation Only  
\*\*Limited to State Laboratory Program Participants

## WEIGHTS AND MEASURES IN THE NEWS

**Eyewitness News 3 (WFSB.com)**  
*Experts show how to get the proper weight of favorite items*

<http://www.wfsb.com/story/28274453/experts-show-how-to-get-the-proper-weight-of-favorite-items>

**Sandusky Register**  
*Balancing the scales*  
<http://www.sanduskyregister.com/new/government/7720076>

**Commerce.Gov**  
*Weights and Measures Week 2015:  
On the Path to Tomorrow*  
<http://www.commerce.gov/blog/2015/03/04/weights-and-measures-week-2015-path-tomorrow>

**ABC News 7**  
*Consumer Alert: The olive oil you buy may be a rip-off*  
<http://www.wjla.com/articles/2015/03/consumer-alert-the-olive-oil-you-buy-may-be-a-rip-off-111994.html>