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Draining Test Measures and Provers

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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 s (± 5 s) pour followed by a 10 s drain with the measure held at a 10° degree to 15° angle from vertical.

N.4.4.2. Drain Times for Bottom Drain Test Measures or Provers. – Bottom drain field standard provers require a 30 s 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 s ± 5 s. Then, the remaining liquid is drained for 10 s at a 10° to 15° 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.

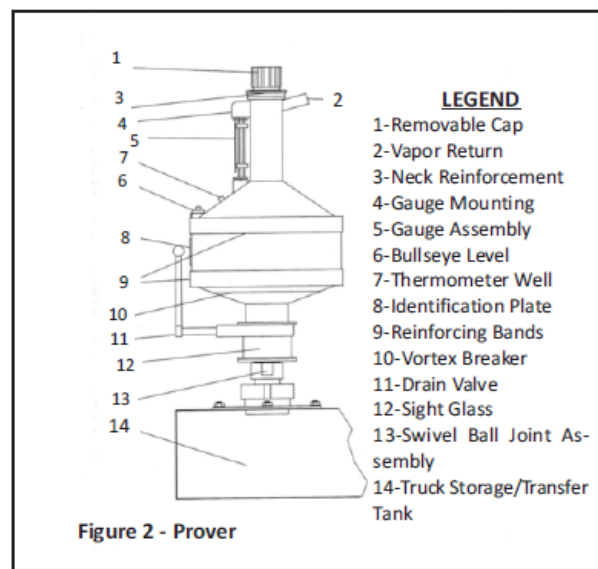
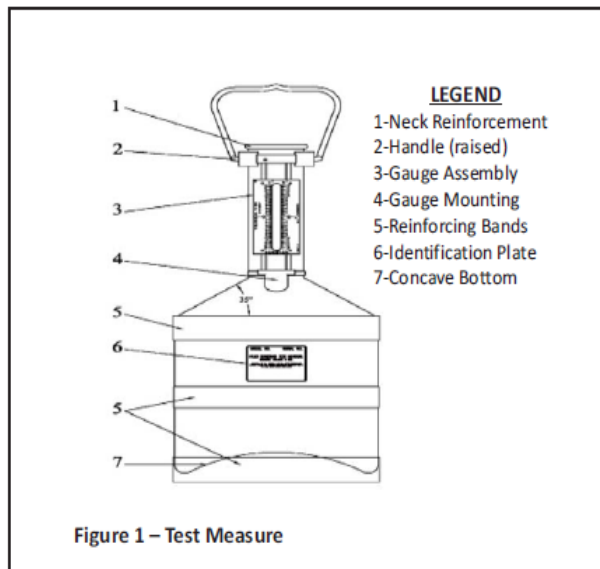
Frequently Asked Questions:

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.



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° to 15° 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° 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° angle from vertical as shown in Figures 3 and 5.



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

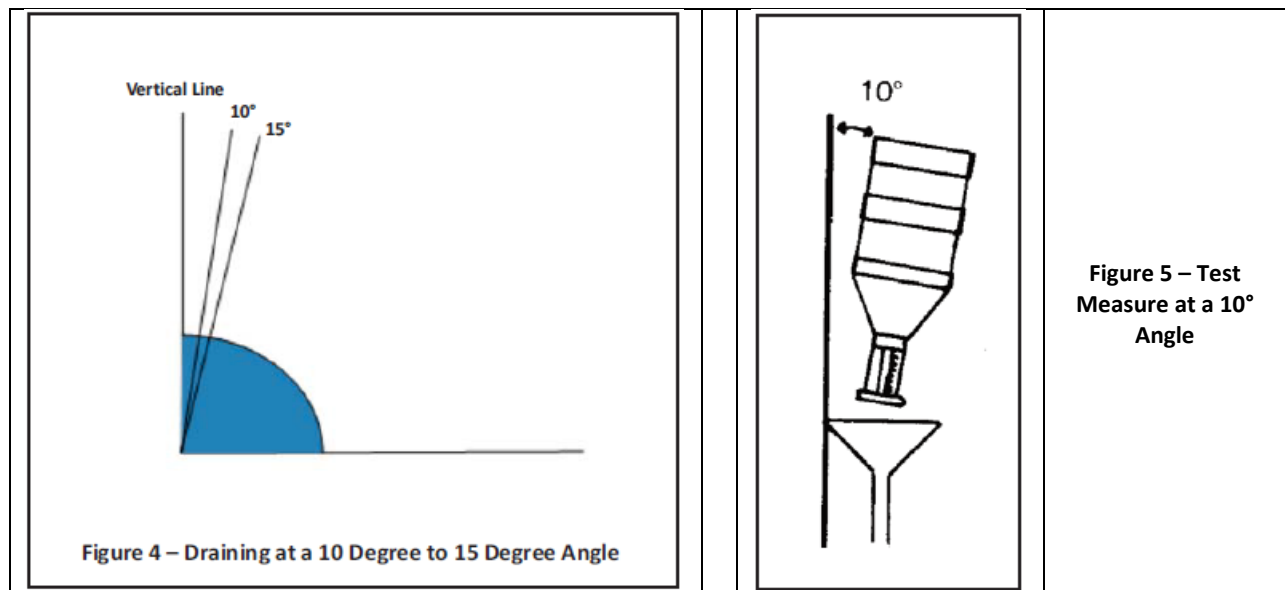


Figure 4 – Draining at a 10 Degree to 15 Degree Angle

Figure 5 – Test Measure at a 10° 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 s and then drained for 10 s at a 10° to 15° 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.



Figure 6 – Inspector Draining a Prover

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 s. See Figure 6 - Inspector draining a prover.

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.