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Testing Blend Retail Motor Fuel Dispensers (RMFDs)

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So you want to test a blend-product dispenser? Before addressing this, let's explore the operation of blend-product dispensers.

A blend-product dispenser has a storage tank for a high-grade and a low-grade product. Blending different grades of the same product produces the blended product. One advantage of the blend dispenser is that only two storage tanks (one for high-grade product and another for low-grade product) are needed for the system instead of three or more (one each for high-grade, low-grade and one for any grades in between). The product can be blended with fixed ratio blenders located prior to the inlet of the high- and low-grade meters or by ratio valves that control the amount of product through each of the two meters.

The fixed ratio blenders direct product from both the high and low grades in correct portions to a separate meter to measure and dispense the intermediate grade. In some dispensers the ratio valves are on the discharge of the high- and low-grade meters. In this case, both the high- and low-grade meters drive the computing device simultaneously; both meters electronically add to give the total blended throughput. Typically blend dispensers may provide up to three intermediate blended products (variable ratio type).

The Test

The procedure for testing retail motor fuel dispensers for blended products is located in NIST HB 112, "Examination Procedure Outline For Commercial Weighing and Measuring Devices", EPO 22. Read the safety instruction carefully and perform the inspection, pretest determinations, and apply the test notes. After these steps you are ready to perform the test portion of the EPO.

For this article, the maximum flow rate of the meter is less than 80 L (20 gal per minute so the test will require 5-gallon drafts (see NIST HB 44, Section 3.30, Paragraph N.3.4.) Assuming that the equipment has been in service for more than 30 days, we will apply the maintenance tolerance, which is 6 cubic inches for a 5-gallon test draft (see NIST HB 44, Section 3.30, Paragraph T.2.)

Your first test will be a normal test of the *lowest grade* of fuel. A normal test is a test performed at the maximum discharge flow rate or at flow rates down to and including one-half the flow rate (see NIST HB 44, Section 3.30, Paragraph N.4.1.) .

1. Open the nozzle and dispense 5 gallons of product into your test measure or prover with the nozzle lever at the highest setting or fully open. At the beginning of the first delivery check for a computer jump. The suppression of the first 0.009 gallons and associated price is acceptable. If this test is close to or exceeds the tolerance limit repeat

the test. If you suspect a problem with repeatability a minimum of three test drafts must be taken at the same flow rate before repeatability tolerances can be applied (see NIST HB 44, section 3.30, Paragraph T.3.).

2. Perform the normal test on the *highest grade*. If this test is close to or exceeds the tolerance limit, repeat the test. However, if you want to apply repeatability tolerances, the same test must be performed three times.

3. Then perform a slow-flow test on the *intermediate blend*. The slow-flow test is a test performed at the slower of 5 gallons per minute, or the minimum discharge rate marked on the device, or the minimum discharge rate at which the device will deliver when equipped with an automatic discharge nozzle set at its slowest setting. (See NIST HB 44, Section 3.30, Paragraph N.4.2.2.) If this test and the previous full flow test are within tolerance, no additional tests are needed.

If an error is observed that is at or near the tolerance limit, repeat this test. Again, if you want to apply repeatability tolerances, the same test must be performed a minimum of three times. If all previous slow flow tests are at or near the respective tolerance limit then perform a slow-flow test of the first blend above the lowest grade and a slow-flow test of the first blend beneath the highest grade.

If any test performed at any flow rate exceeds the applicable tolerance limit, and the error is confirmed by performing another test at the same flow rate under the same test conditions, the dispenser or the appropriate measuring element should be rejected and corrective action taken according to policy in your jurisdiction. The same applies if the average error of three or more test drafts taken at the same flow rate and under the same conditions exceed repeatability tolerance.

4. To prevent the lowering of octane of the highest grade product return blended products to the storage tank containing the lowest octane.

5. As you are testing observe agreement between primary indicating and recording elements. Check for money value computations on other blends by dispensing 1 gallon.

6. Check for antidrain means. An antidrain valve is located in the nozzle to prevent the hose from draining. RMFDs have a wet hose, that is, the hose must remain full to ensure that each delivery is accurate. To perform a test of the anti-drain valve, turn off the dispenser, open the discharge valve, and raise at least three feet of the hose higher than the nozzle. The antidrain valve is malfunctioning if fuel continues to flow after the initial pressure surge is relieved.

7. Check for security means and record the number of gallons of product dispensed.