Blender Pump Sampling and Testing Procedure

Introduction

With the increasing number of blender pumps, also known as a multiple product dispensers, present in the marketplace, sampling and testing procedures specific to the operation of this type of retail fuel dispenser are needed. This procedure outlines key steps required to obtain and analyze representative fuel samples from this specific type of retail fuel dispenser. When more than one product is dispensed utilizing a common hose at a blender pump, or a single hose multi-product dispenser, a small amount of the last product dispensed remains in the hose. The remaining volume, which is dispensed during the next sale, is small, usually ranging from 0.1 to 0.3 gallons depending on the hose length. While this is not a large portion of a 15 gallon sale, such volumes may influence the characteristics of the volume of a typical 1 liter fuel sample. Therefore, when obtaining samples from these dispensers, the residual hose amount must be taken into account. Many times, a visual inspection of the sample may not determine if the aliquot taken from the sampled lot is homogenous or representative of the intended sample.

Blender Pump Example

The following offers examples of what occurs if product remaining in the hose is not considered. Blender pumps, an example pictured here, may dispense products such as E20, E30, and E85 from a single hose and nozzle. An example of an unrepresentative sample would be that if the former sale was E85 containing 83 volume (v)% ethanol and a 1 liter sample of E20 was then pulled without draining the preceding sample from the hose, the sample pulled would be close to 83v% ethanol content. Even if no blending is employed, inaccuracy can still occur. If 3 products are dispensed from a single hose, the previous product in the line can distort the characteristics of the next fuel sample. As an example, assume the 3 products dispensed from the hose are E0, E10, and E15: If E15 was the last product dispensed and then a 1 liter sample of E0 or E10 is taken (without draining the hose) the sample may contain more than 10v% ethanol, which aside from being an incorrect measurement, could lead to problems of perceived non-compliance since different regulations (e.g. vapor pressure) apply to each of the three fuels.

Recommended Sampling Procedure

Correct sampling procedures are critical to obtain a sample representative of the product intended to be tested. The correct sample volume and appropriate container selection are important decisions that can impact test results. This sampling procedure pertains, primarily, to samples for determining ethanol content. If other tests are also to be performed additional procedures may apply. As such, it is important to review all intended tests and test methods to

be performed to determine the proper sampling technique, proper containers, and any special handling required for each test method. For example, if volatility (e.g. vapor pressure) is to be measured, certain procedures such as ASTM D5842-04(2009) "Standard Practice for Sampling and Handling of Fuels for Volatility Measurement," or in the case of California Air Resources Board (CARB) modified ASTM D5842-95 "Standard Practice for Sampling Fuels for Volatility Measurement", may be applicable. Additional ASTM sampling methods such as D4057 "Practice for Manual Sampling of Petroleum and Petroleum Products" may also provide insight into improved sampling techniques. It is very important to establish and rigorously follow a sampling procedure based on this information.

Sampling Procedure

Caution: Gasoline and ethanol motor fuels are flammable and safety precautions are advised.

1. Calculate the necessary sample volume to perform the desired analysis factoring in a residual amount for any retests that may be necessary. A minimum sample size of 1 liter (or 1 U.S. quart) is recommended.

NOTE: Gasoline ethanol blend samples should be collected in glass containers whenever possible. If metal containers are used, do not use soldered containers since solder contains lead, which along with soldering flux could contaminate the sample. The use of plastic sample containers is not recommended and should be avoided.

2. Upon arrival at the retail station, notify the retail station attendant of the sampling event.

3. Identify blender pump and document the pump placement, specifics for sample identification and future reference. Include information in the hose configuration of the blender pump. Digital photographs may be used to capture the pump placement and hose configuration.

4. Dispense a minimum two one-liter samples (0.5 gallon) into an auxiliary container to flush the residual hose amount. The flush volume should be dispensed into the container and returned to the underground tank (preferably the predominately ethanol fuel blend tank) before pulling the 1 liter sample to be analyzed. This will ensure that the hose is filled with the desired product being tested.

5. Dispense desired ethanol fuel blend into a clean sample container.

6. Label sample container with the retail location (or location code if sample results are to be kept confidential), the number of the dispenser, the product sampled and the date and the time the sample was collected.

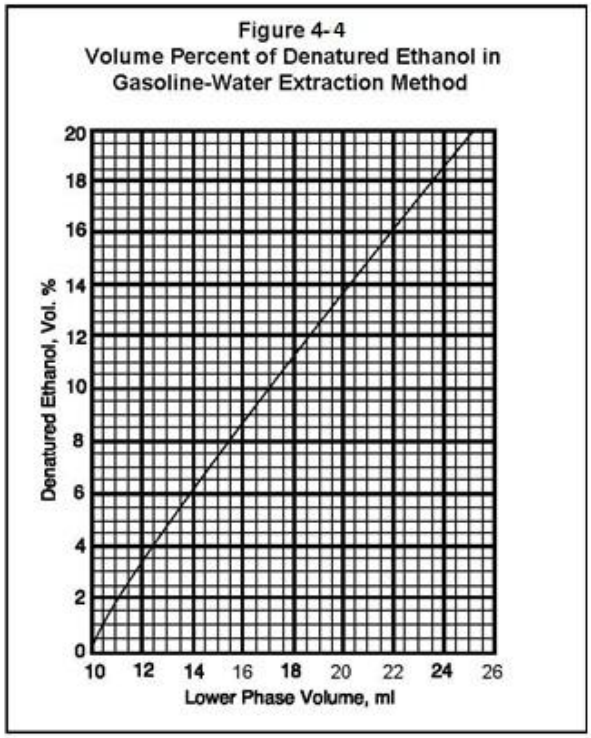
7. If the product is being shipped to a testing laboratory, they will normally provide a container along with proper packaging as well as instructions for complying with any D.O.T (Department of Transportation) shipping requirements.

Ethanol Content Determination

The appropriate test to determine ethanol content for samples contain 20v% to 83v% is ASTM D5501 "Standard Test Method for Determination of Ethanol Content of Denatured Fuel Ethanol by Gas Chromatography." The appropriate test to determine ethanol content for samples containing less than 20v% is ASTM D5599 "Standard Test Method for Determination of Oxygenate in Gasoline by Gas Chromatography and Oxygen Selective Flame Ionization Detection".

Field Tests

Field tests are, of course, not as accurate as laboratory test methods and should not be used for compliance purposes. They can, however, be useful as a screening tool if a blend is suspected of being inaccurate. The most commonly used field test to estimate ethanol content is the "Water Extraction Method".



Estimation of Alcohol Content in Blends-Water Extraction Method

Place 100 milliliters (ml) or about 4 ounces of the gasoline/ethanol blend in 100 ml glass stoppered graduated cylinder. Pipette 10 ml (less than half an ounce) of water into the cylinder and shake thoroughly for about one minute. Set aside for 2 minutes. Read the volume of the alcohol-water layer on the bottom and compare to the graph below to read the alcohol content.

For example, a reading of 17.2 ml lower phase volume by this test is 10v% alcohol in the blend. (See chart) Keep in mind this method provides only an estimate for ethanol content with an accuracy expected +/- 5%.

This method and additional ethanol information can be found in the RFA Publication "Fuel Ethanol Industry Guidelines, Specifications and Procedures" available on the RFA website: www.EthanolRFA.org.