Phase-Two™ Float vs. Conventional Water Float Demonstration

The performance of the Phase-Two™ Water Float was compared against a conventional Veeder-Root Water Float in a low-density phase separation scenario representative of a filling station receiving a delivery of water-contaminated E10 gasoline.

Thirty (30) gallons of "Regular" grade (87 octane) E10 gasoline was purchased from a nearby commercial retail station and received into ordinary five (5) gallon gas cans. The density of the fuel was measured to be 740 kg/m^3 at 22.7 °C using an Anton-Paar brand handheld densitometer, with 9.6% ethanol by volume as measured by a Veeder-Root Fuel Analyzer (an optical infrared measurement device, not a commercial product).

Five gallons of the fuel was added to a vertical cylindrical tank large enough to hold side-by-side ATG probe tubes with conventional 4" diameter Water and Phase-Two™ float kits installed. The bottom section of the cylinder was constructed out of glass which allowed the Phase-Two™ and Water floats to be observed. A 4" tall block of white Delrin® was also placed on the bottom of the container behind the floats, to coarsely approximate the effect of the sloping sidewalls of a horizontal cylindrical UST, which significantly increases the measured depth of water or phase-separated liquid that collects on the bottom compared to a flat-bottom tank.

The remaining 25 gallons of fuel were then contaminated with a total of 800 ml (0.21 gal) of water, equally divided among the can. Each can were then agitated by hand to pre-mix the water with the ethanol blend fuel. The contaminated gas was then pumped into the tall cylinder, and was allowed to splash on top of the initial fuel. This process coarsely simulates a truck delivery of 5,000 gallons of fuel contaminated with 42 gal of water into a UST containing 1,000 gallons of dry E10.

As the contaminated gasoline entered the tank, the fuel quickly turned cloudy, and within a few minutes a discrete layer of phase separated liquid collected on the bottom of the tank and began rising even as the rest of the fuel was added. After all of the fuel was added and allowed to settle for several minutes, the phase separation layer grew to a total height of ~4.75" (based on a ruled measuring tape outside of the glass) and both the phase separated and fuel layers gradually began to clear.

As the phase separation event proceeded, the Phase-Two™ float could be seen rising with the growing phase-separated layer on the bottom of the tank, while the conventional water float remained on the bottom of the tank at all times. After the experiment, analysis of a gasoline sample taken from the top of the remaining fuel phase revealed a density of 740 kg/m^3 at 23.0 °C (unchanged) with an ethanol content of 7.1% (-2.5 % points, or a 1/4 reduction in the ethanol concentration).

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