Vaporless Manufacturing, Inc.

Quality Petroleum Equipment
Solutions for Over 20 Years

ARM-4073

AST-4010
AST-4012

ISM-4080
ISM-4081
ISM-4080 MC

LD-2000
LD-2000\E

LD-2200
LD-2200\75

LD-3000
LD-3000\E
LD-3000\FL

LDT-890
LDT-890\AF

OFP-2\1
OFP-2\2

OFP-3\1
OFP-3\2

FST-2

PLC-5000

SUMP-300

STM-4201

VMI-PMTT

Date: May 24, 2010

Subject: Leak Detector Testing Equipment

Vaporless Manufacturing, Inc. was recently asked to comment on line leak detector testing with our LDT-890(\AF) as compared to leak detector testing with the EZY Chek testing system. This document will start with some differences between the two pieces of equipment and then move on to a comparison of the testing procedures.

The VMI LDT-890(\AF) is a precision piece of testing equipment that allows the operator to calibrate a 3 GPH at 10 PSI leak rate for each catastrophic leak test performed. The method and equipment provided allow for an accurately calibrated leak rate regardless of the pump operating pressure, fuel type, temperature, or viscosity, all of which affect the calibration of a correct leak rate.

The EZY Chek leak detector testing system is a fixed orifice tester. VMI tried to use fixed orifices 23 years ago and rejected them because of the following:

Pump Operating Pressure: The higher the pressure, the more fuel will pass through the same orifice or hole. For calibration of the correct leak rate, pump pressure needs to be reduced to 10 PSI so the correct flow will pass through the orifice for the fuel you are testing. The EZY Chek does not appear to have a means to set pressure at 10 PSI as described below.

Fuel Type and Temperature of the Fuel: While these are different variables, taken together they determine the viscosity of the fuel. Viscosity affects the amount of fuel that will flow through an orifice at a specific pressure. Every fuel has a different viscosity; the viscosity is different in regions throughout the USA depending on the fuel stock and the refinery it comes through. For any given fuel, as the temperature goes up, more fuel will flow through the same orifice. As fuel temperature goes down, less fuel will flow through the same orifice.

You also have to adjust to different blend and fuel types. While there are small viscosity differences between Regular fuel and Premium, these are different than E10 or any other ethanol fuel blend. E85 will pass significantly more fluid through the same orifice than Regular. Now we move to Diesel. The viscosity of diesel differs significantly depending on whether the weather is cold (winter) or warm (summer). Add biodiesel and the viscosity goes even higher. We have received reports of people testing biodiesel lines for catastrophic leak detection and failing a high percentage of the leak detection (ours and other manufacturers). When they measured the flow at 10 psi, they found they were well below the actual test protocol. This testing occurred with both the EZY Chek tester and the Red Jacket FX tester (which has a similar although different viscosity compensation problem).

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Stated simply, at different times of year the fuel temperature and therefore viscosity is different, you also have fuel blends; fixed orifices do not adjust for these conditions.

Cleaning of Fixed Orifices: Unless the fixed orifice is extremely hard and made from the correct metal, the orifice wears every time you clean it. If you do not clean the orifices a film builds up and changes the hole size, changing the leak rate.

While smaller than other variables, most metals change dimensions from cold to hot, this changes the orifice size also.

The EZY Chek calibration protocol states, "Once hooked up the line pressure will build to the required 10 PSI." If all valves on the testing unit are closed as per the instructions, line pressure should build to full pump operating pressure. How is pressure limited to 10 PSI? There is no pressure regulator in place. This is in opposition to the VMI method of testing. The VMI LDT-890(\AF) includes a pressure regulator used to calibrate a precise 3 GPH at 10 PSI leak rate. Once the proper leak rate is established, the pressure regulator is bypassed, though the calibrated orifice continues to be sized perfectly to flow 3 GPH at 10 PSI.

The EZY Chek calibration process goes on to state that collecting 189 ml of fluid in 60 seconds verifies an accurate leak rate. For argument's sake, say 189 ml is collected and the orifice is found to be accurate. If the system is accurately calibrated for a 3 GPH at 10 PSI leak on a particular fuel, which fuel was the unit calibrated on? As discussed above, different fuels have different viscosities.

Moving on to the EZY Chek leak detector testing protocol. The testing instructions direct the technician to start with a 9 GPH leak. If the leak detector sees this leak, the leak rate is decreased down to 6 GPH. If the leak detector sees the 6 GPH leak, the leak rate is further decreased to 3 GPH. While intuitively this makes sense, from a mechanical perspective the company does not understand how leak detectors work or the environment they operate in. This type of test changes the test parameters the leak detectors actually function under and provides a false sense of security about the ability of line leak detection to catch leaks. Leaks do not start out large and get smaller, they are usually fairly constant and if anything slowly get larger, not smaller. Starting with a 9 GPH leak provides a means for the leak detector to move into the leak sense mode slowly. It is easier for a leak detector to stop on the metering pin with a large leak and stay in this position while the leak rate is decreased. Testing in this manner artificially reduces the line shock and transition speed the leak detector must deal with in normal operations. This is no longer an actual test under normal field conditions.

Several years ago a major oil customer requested VMI to perform a field evaluation concerning two test companies. The two companies had significantly different failure rates of line leak detection equipment. Test company A, was using the VMI protocol and equipment. Company A was testing behind company B. Company B was starting with a big leak, then dialing the leak rate down. We asked the technician from company B to retest the leak detectors that passed with his test protocol, this time starting with a 3 GPH leak. One of the three leak detectors that had just passed now failed the test when started with a 3 GPH leak. The technician was confused, thinking his company was following a valid test protocol. When he understood the physics behind the two test protocols and his company retested the rest of the leak detectors as they were supposed to, both companies had the same failure rate. The physics of this apply to all LLD manufacturers.

Please contact me if you have any questions.

Sincerely,
Gabe Messerly

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