HEALY

Franklin Fueling Systems

700 Series Hanging Hardware

Installation, Operation, and Maintenance Manual

For use with dispensers equipped with Dresser WayneVac or Gilbarco VaporVac Vacuum-Assist Vapor Recovery Systems

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Important Safety Messages

Franklin Fueling Systems (FFS) equipment is designed to be installed in association with volatile hydrocarbon liquids such as gasoline and diesel fuel. Installing or working on this equipment means working in an environment in which these highly flammable liquids may be present. Working in such a hazardous environment presents a risk of severe injury or death if these instructions and standard industry practices are not followed. Read and follow all instructions thoroughly before installing or working on this, or any other related, equipment.

As you read this guide, please be aware of the following symbols and their meanings:

Warning 

This symbol identifies a warning. A warning sign will appear in the text of this document when a potentially hazardous situation may arise if the instructions that follow are not adhered to closely. A potentially hazardous situation may involve the possibility of severe bodily harm or even death.

Caution 

This is a caution symbol. A caution sign will appear in the text of this document when a potentially hazardous environmental situation may arise if the instructions that follow are not adhered to closely. A potentially hazardous environmental situation may involve the leakage of fuel from equipment that could severely harm the environment.

Warning 

Follow all applicable codes governing the installation and servicing of this product and the entire system. Always lock out and tag electrical circuit breakers while installing or servicing this equipment and any related equipment. A potentially lethal electrical shock hazard and the possibility of an explosion or fire from a spark can result if the electrical circuit breakers are accidentally turned on during installation or servicing. Please refer to the Installation and Owner's Manual for this equipment and the appropriate documentation for any other related equipment, for complete installation and safety information.

Warning 

Follow all federal, state, and local laws governing the installation of this product and its associated systems. When no other regulations apply, follow NFPA codes 30A and 70 from the National Fire Protection Association. Failure to follow these codes could result in severe injury, death, serious property damage and / or environmental contamination.

Warning 

Always secure the work area from moving vehicles. The equipment in this manual is usually mounted underground, so reduced visibility puts service personnel working on this equipment in danger from moving vehicles entering the work area. To help eliminate these unsafe conditions, secure the area by using a service truck to block access to the work environment, or by using any other reasonable means available to ensure the safety of service personnel.

Warning 

Use circuit breakers for multiple disconnect to turn off power and prevent feedback from other dispensers.

Contents

Introduction

This manual describes the tools, methods and skill levels required to install, startup, and maintain a Healy 700 Series Vapor Recovery Equipment, which includes the Healy Model 708 or 709 nozzles, Healy S7 Coaxial Product Hose, and associated Healy Hanging Hardware accessories.

Only Healy trained and certified contractors may perform these retrofits or the warranty will be voided. The installer must also be a skilled petroleum technician and thoroughly familiar with Federal, State, and Local code requirements for the installation and repair of gasoline dispensing equipment.

In addition, the installer shall be aware of all the necessary safety precautions and site safety requirements in order to assure a safe, trouble-free installation.

Product Overview

Franklin Fueling Systems (FFS) is currently marketing the Healy model 800 and 900 series nozzles, with the Healy VP1000 vac-assist pump, into Texas as an Onboard Refueling Vapor Recovery (ORVR) compatible Stage II Vapor Recovery system (TCEQ approved based on CARB Executive Order G-70-191).

In new installations, the combination of the 800/900 Nozzle and VP1000 pump is the ORVR system of choice in Texas, but in existing Stage II vac-assist sites, FFS has developed the new 700 series nozzle and hanging hardware system to also meet the ORVR requirements. The 700 series nozzle and hanging hardware will simply install directly in the place of existing non-ORVR hanging hardware, without the need to modify the dispenser or replace the existing vac-assist pumps.

FFS has made a slight modification to the Healy 800 Series Nozzle to allow proper ORVR operation directly with Gilbarco VaporVac and Dresser WayneVac equipped dispensers. This modified 800 Series nozzle will be marketed by FFS as a Healy 708 series nozzle, together with Healy Coaxial Hose and Hose Accessories, which will also include a slight modification (S7 hose end) to prevent improper inter-connection with other Healy Systems that require a Healy vacuum source, like the existing 800 and 900 Series Nozzles.

With the same slight modification, we also will be offering the 900 series nozzle to allow proper ORVR operation directly with Gilbarco VaporVac and Dresser WayneVac equipped dispensers. This modified 900 series nozzle will be marketed by FFS as a Healy 709 series nozzle, along with the same Healy Coaxial Hose, Hose Accessories, and S7 Hose inter-connect.

As noted above (in comparing 800 and 900 Nozzles), the only difference between the 708 nozzle and 709 nozzle is the boot interlock feature, which is utilized in the 709 nozzle like its existing 900 series nozzle design.

Keywords/Definitions

A/L = Air to Liquid ratio
: An air over liquid ratio used to measure the volume of air returned to a storage tank when a specific volume of gasoline is dispensed through a vapor recovery system.

AST = Aboveground Storage Tank
: An AST is where product is stored at a facility in a storage tank aboveground.

Condensate Trap
: The low point in a vapor line where liquid may be present.

Hanging Hardware
: The components needed on the outside of a dispenser for a Healy vac-assist vapor recovery system. This includes whiphose, breakaway, coaxial hose, and nozzle.

Inches Water Column (WC)
: The measurement used for the Healy system to monitor negative and positive pressures.

Inverted Coaxial Hose
: An inner hose is installed within a typically ¾" hose. With an assist system coaxial hose, the inner hose collects vapors and the surrounding outer hose will have product flowing through to the nozzle. This is inverted from balance system coaxial hoses.

ORVR = Onboard Refueling Vapor Recovery
: A vehicle's own vapor recovery system which forces tank vapors into a carbon canister on the vehicle, which filters the hydrocarbons and releases clean air.

Stage I Vapor Recovery
: The collection of vapors during storage tank deliveries.

Stage II Vapor Recovery
: The collection of vapors during vehicle refueling.

Splitter Valve
: A Healy part that separates the product and vapor paths.

Ullage
: The air or vapor space in a storage tank above the fuel.

UST = Underground Storage Tank
: An UST is where product is stored at a facility in a storage tank underground.

Vacuum Source
: The mechanical or electrical device that assists in returning vapors back to the storage tank.

Theory Of Operation

The 700 series nozzles are a vacuum-assist type nozzle design, with vapor collection through the nozzle boot assembly which creates a face seal to the vehicle fill neck over the nozzle spout. The nozzle boot assembly incorporates two air bleed holes to prevent excessive vacuum on the vehicles tank. Unlike the 800 and 900 series nozzles, which control the vapor flow at the Vapor Check Valve in the nozzle, the 700 series nozzles work in conjunction with the variable speed vacuum pumps of Gilbarco VaporVac and Dresser WayneVac equipped dispensers to proportion the vapor flow back to the storage tank. Like the 800 and 900 nozzles, the 700 series nozzles include a simple internal device, called the ORVR Sensor that sense and reacts to vehicle fill-neck pressure to detect and efficiently recovery vapor from ORVR and Non-ORVR vehicles.

The 700 series nozzles are a no pressure-no flow design, which does not allow the flow of liquid unless the nozzle inlet is pressurized at the main valve. The 700 series nozzles also incorporate an automatic shut-off mechanism, called the aspirator circuit, which is designed to stop the flow of liquid when the tank is full.

Additionally, the 708 includes an over-horizontal shut-off mechanism (no product flow if nozzle spout is higher than Nozzle inlet), whereas the 709 includes an interlock boot feature (boot compression force required for product flow). Product flow through the 700 series nozzles is recommended to be 6-10 gallons per minute, with at least 3 gallons per minute to ensure that the automatic shut-off mechanisms operate properly. Within the recommended 6-10 gallon per minute flow rate range, the system will be able to demonstrate 0.90 to 1.10 Air to Liquid (A/L) ratios under Non-ORVR conditions.

Under ORVR fueling conditions, the 700 series nozzles will demonstrate A/ L ratios about one third that of Non-ORVR operation. By limiting the A / L ratios on ORVR vehicle refueling, the 700 series vapor recovery system will be able to manage the storage tank ullage pressures negative, thus eliminating fugitive emissions associated with Non-ORVR compliant Stage II vapor recovery systems.

With the slight modification of the 700 series nozzles operation, versus the 800 and 900 series nozzles, the vapor inter-connection of the nozzle and the coaxial hose was also modified to prevent improper mixing of product. The 700 series nozzles will not use the standard Healy coaxial hose connections (S2 or F2 hose ends), but rather a new inverted vapor connection will be utilized at the nozzle and hose. The hose connection will be a Healy swivel (S) thread with 700 Series (7) inverted vapor connection. The S7 hose end will only connect with the 700 series nozzle vapor path, which is the same sealing method as currently utilized on Healy Systems hanging hardware except inverted from hose and nozzle.

Although the 700 series will utilize the S7 connection, all other Healy Systems hose accessories will remain unchanged from the 800 and 900 series products. The 700 series nozzles will utilize the same P/N 8701VV in-line breakaway, and the same 75 Series ¾″ whip hoses, available with M34 thread connections (S3 or F3) to direct connect with WayneVac or VaporVac dispenser outlet threads.

The 700 series will utilize the same in-hose flow limiter, (P/N 1301) optional accessory for installation at the breakaway, to reduce flow rates below the EPA required 10 gallons per minute. The 700 series will also incorporate at least one Pressure/Vacuum (P/V) valve on the storage tank vent stack piping, designed with operating characteristics to open at a pressure of about 3.0 ± 0.5 inches water column positive and open at a vacuum of about 8.0 ± 2.0 inches water column negative (P/N HPVV).

Installation Instructions

75 Series Hose and 8701VV Breakaway Assembly Instructions

Note: The 8701VV breakaway is delivered loosely assembled. Handle cautiously to avoid dropping and/or misplacing parts.

1. Remove the breakaway from the packing materials.
2. Remove the shear screw from the breakaway.
3. Select the whip hose assembly.
4. Lubricate the quad seals, o-ring seals, and straight thread of the whip hose.
5. Assemble the whip hose to the product input half of the breakaway, ensuring that the larger end of the conical spring is centered in the groove on the internal white vapor valve.
6. Tighten the whip hose (Figure 1) onto the breakaway to 35 foot pounds.
7. Be sure the vapor tube fitting slides easily into the dispenser end valve before final tightening.
8. Select the delivery hose.
9. Lubricate the o-ring seals, quad seals, and straight thread.
10. Assemble the end with the quad seal to the output half of the breakaway.
11. Install the secondary hose and tighten to 35 foot pounds.
12. Be sure the vapor tube fitting slides easily into the nozzle end valve before final tightening.
13. Carefully fit both halves of the breakaway together.
14. Using the alignment pin, fully compress both halves and insert the shear screw and hand tighten.
15. Final tighten to 20 inch pounds. Tools should not be necessary to initially start the screws.

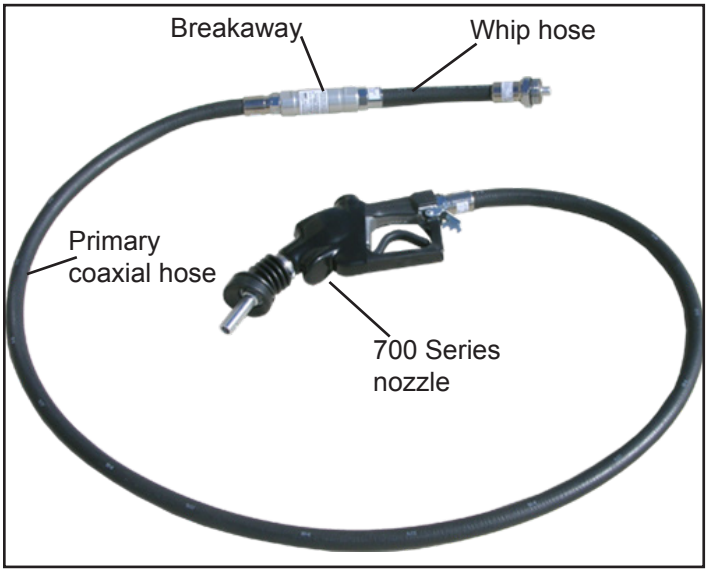


Figure 1: Break-Away Assembly

Whip Hose to Dispenser Installation

Note: Do not use any thread sealing compounds on the whip hose to dispenser inlet connection.

1. Lubricate the whip hose o-ring seals.
2. Tighten by hand the whip hose into the dispenser's outlet casting.
3. Tighten to 60-70 foot pounds.

Primary Hose to 708/709 Nozzle Installation

Note: The Healy Model 708 and 709 nozzles may only be connected to the S7 hose connection.

Note: S7 Hose connection utilizes straight threads and o-ring sealing. Do not use any thread sealing compounds on the hose to nozzle connection.

1. Remove the nozzle from the packing materials.
2. Lubricate the nozzle o-ring seals.
3. Tighten the nozzle by hand onto the primary hose end.
4. Tighten to 60-70 foot pounds.

Note: The Healy Model 708 and 709 nozzles are available as Full Service (-FS, with hold open clip) and as Self Service (-SS, without a hold open clip). Follow all local regulations regarding the use of hold open clips.

Note: Installation of the Healy Model 700 series nozzle will typically not require any modification of the dispenser nozzle boot. If modification of the nozzle boot position is required, follow dispenser manufacturer instruction to accommodate the Healy 700 Series Nozzle.

Startup Instructions

1. Visually inspect all new hardware connections for signs of potential leak points. Repair any issues immediately before proceeding.
2. Authorize the dispenser.
3. Visually inspect all new hardware for leaks. If leaks are present immediately repair leaks before proceeding.
4. Purge air from new hardware by pumping about one gallon from each fueling point into an approved container.
5. For each fueling point, perform a Flowrate Testing as outlined in the Testing Instructions section.
6. For each fueling point, perform the Shut-Off Test as outlined in the Testing Instructions section.

Note: Follow all local regulations regarding the startup and testing requirements of vapor recovery equipment. Franklin Fueling Systems recommends that an Air to Liquid ratio test be performed after any installation or repair of the vapor recovery system. See the Testing section of this manual for details.

Note: DO NOT adjust the A/L ratio at the Healy 700 series nozzle unlike other Healy nozzles. Please refer to the dispenser vacuum source manufacturer's A/L adjustment specifications.

Note: The Gilbarco VaporVac system uses a puff or boost circuit that temporarily increases the speed of the vacuum assist pump at the beginning of a fueling event. The Healy 700 series hanging hardware has been designed to function properly with the Gilbarco VaporVac puff circuit when enabled or disabled.

Testing Instructions

Flow Rate Testing

Compliance with the 10 gallon per minute flowrate limitation shall be determined with the following methodology. It is recommended that the maximum dispensing rate through each nozzle/hose assembly be verified. Maximum dispensing rates are achieved with no other dispensing occurring from the same submersible turbine pump (STP). Dispensing rates determined while conducting the Air to Liquid Testing procedure listed in the Testing Instructions section are acceptable for verifying compliance with the 10 gallon per minute flowrate limitation.

Dispense gas into a vehicle or approved container. Dispensing shall be conducted in the ″handheld, wide-open″ mode. Using a stopwatch accurate to at least 0.2 seconds, begin timing the dispensing rate after at least one gallon has been dispensed. This one gallon buffer is necessary due to the ″slow-start″ nature of some dispensers.

Determine the time required to dispense 2, 3, 4, or 5 gallons of gasoline. The facility shall be deemed in compliance with the 10 gallon per minute limitations if the elapsed time meets, or exceeds, the times in Table 1.

If the dispensing rate exceeds the allowable limit, a certified flow limiting device shall be installed.

Product Dispensed, Gallons	Minimum Allowable Time, Seconds
2.0	11.8
3.0	17.7
4.0	23.6
5.0	29.5

Table 1: Verification of 10 GPM

Note: The times have been corrected to allow for the accuracy of the measurement.

Shut Off Testing

The nozzle is tested at the factory in accordance with UL Standard 842. The nozzle's automatic shut off feature needs to be tested at all service clip positions at full flow.

Dispense product into a container deep enough to cover the small hole near the tip of the spout and verify that the dispensing rate is between 6.0 and 10.0 GPM with the nozzle lever held in the full open (handheld) position. While dispensing, with the nozzle lever held in the full open (handheld) position, immerse the spout until the hole is covered. If shutoff does not occur, turn off the dispenser, remove the spout, and check the O-rings. Replace the O-rings as necessary (Part No. 6206 or Spout O-ring Kit).

Note: If repeated attempts to repair nozzle does not result in successful shut off, replace the nozzle.

Repeat the preceding test two additional times (3 tests total) to ensure that the auto shutoff feature is working properly. There should be no hesitation to the shutoff; it should be quick and positive. If shutoff tests are successful, the nozzle can be put into service. If either additional shutoff test fails, turn off the dispenser, remove the spout, and check the O-rings. Replace the O-rings as necessary (Part No. 6206-OR Spout O-ring Kit) and then retest the Shut Off Test.

Note: If repeated attempts to repair nozzle do not result in successful shut off, replace the nozzle.

Air to Liquid Ratio Testing

DO NOT adjust the A/L ratio at the Healy 700 series nozzle. This is different from other Healy nozzles. Please refer to the dispenser vacuum source manufacturer's A/L adjustment specifications.

Purpose and Applicability

1. This test procedure is used to quantify the Air to Liquid (A/L) Volumetric Ratio of Stage II vapor recovery systems installed at gasoline dispensing facilities (GDF), provided the nozzles are compatible with the procedure. This procedure provides a method to determine compliance with the A/L requirements specified in the Theory of Operation section of this manual.

Principle and Summary of Test Procedure

1. A tight fitting adaptor is placed on the spout of a dispensing nozzle. The adaptor, which isolates air flow to the nozzle vapor collection ports, is connected to a volume gas meter. Gasoline is dispensed through the nozzle and the volume of air and vapors drawn through the vapor collection ports by the Stage II system vacuum pump is measured. The volume of the air mixture is recorded and compared with the volume of gasoline dispensed to determine the A/L Volumetric Ratio.
2. The test is conducted with the pressure/vacuum (P/V) relief valve(s) on the storage tank vent pipes installed.

Biases and Interferences

1. Nozzle spouts which are damaged such that the A/L adaptor cannot fit over the nozzle spout preclude the use of this test.
2. Refueling points not capable of achieving dispensing rates required for conducting the A/L test preclude the use of this test for determining in-use compliance of certified systems.
3. Location or configuration of the vapor collection ports on the nozzle spout which are not compatible with the A/L adaptor specified in this procedure preclude the use of this test.
4. Bagging, or otherwise sealing any nozzle associated with the vacuum pump serving the nozzle being tested, may bias the test results towards compliance. The A/L test to verify compliance shall be conducted without ″bagging″ any of the nozzles served by a common vacuum device.
5. If the nozzle being tested introduces liquid into the test equipment, the A/L of that nozzle shall be deemed a failure of the A/L standard.
6. Do not drain or remove liquid in either the vapor passage of the hoses or the dispenser vapor piping prior to performing the test. Draining of this liquid gasoline will bias the test toward compliance.
7. Pressure in the headspace of the storage tank, created by draining the gasoline from the portable test tank to the storage tank, may bias the results of the test for systems certified to operate at, or near, atmospheric gauge pressure in the UST headspace.
8. O-rings in the A/L adaptor that are not properly greased may bias the results toward noncompliance. This bias may be eliminated if the O-rings are lubricated immediately prior to each A/L test run.

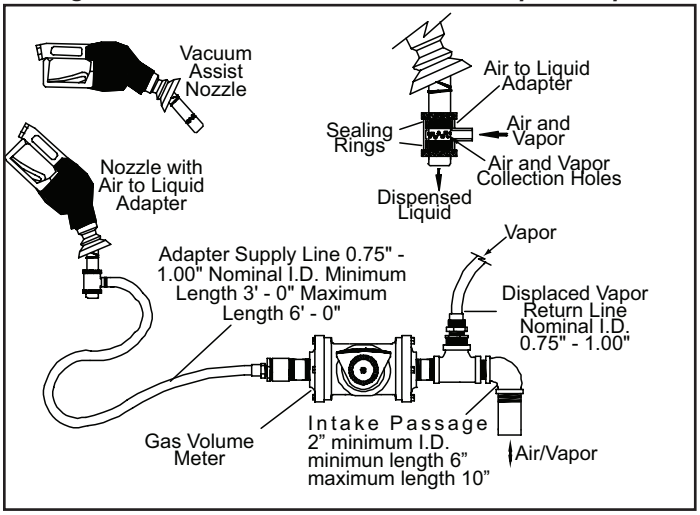
Sensitivity, Range, and Precision

1. The maximum rated capacity of the gas volume meter shall be at least 250 CFH and not greater than 3,000 CFH.
2. The minimum rated capacity of the gas volume meter shall be 25 CFH.
3. The minimum readability of the gas volume meter shall be 0.01 cubic feet.
4. Precision is ±5 percent of the gas volume meter reading.

Equipment

1. Air to Liquid Adaptor.
   Use an Air to Liquid (A/L) adaptor compatible with the nozzle(s) employed at the GDF. The adaptor shall be capable of isolating the vapor holes in the nozzle and be connected to the gas volume meter with gasoline-resistant flexible tubing. The nominal inside diameter of the flexible tubing shall be between 0.75 and 1.00 inches, and the maximum length of the tubing shall be 6 feet. Figure 2 illustrates an A/L adaptor assembled on a nozzle.

Figure 2: Gas Volume Meter and Air to Liquid Adapter



2. Gas Volume Meter.
   Use a Dresser Measurement Roots Meter, or equivalent, to measure the volumetric flowrate through the A/L adaptor. The meter shall be equipped as shown in Figure 2 and the maximum allowable pressure drop(s) across the meter shall be as follows:

For a meter with a maximum rated capacity of 1000 CFH through 3,000 CFH:

- 1.10 inches H2O at a flowrate of 3,000 CFH
- 0.05 inches H2O at a flowrate of 30 SCFH.

For a meter with a maximum rated capacity of 800 to 1,000 CFH:

- 0.70 inches H2O at a flowrate of 800 CFH
- 0.04 inches H2O at a flowrate of 16 CFH

3. Volume Gas Meter Inlet Manifold.
   This manifold is designed to return the vapors displaced from the portable gasoline tank assembly, at atmospheric pressure, to the inlet of the gas volume meter. This manifold shall be two (2.0) inches minimum inside diameter pipe. The intake passage of the manifold shall be no shorter than 6.0 inches and no longer than 18.0 inches. See Figures 2 and 3 for examples.
4. Liquid Volume Meter.
   Use the totalizer on the gasoline dispenser to measure the volume of gasoline dispensed during the test.
5. Portable Gasoline Tank Assembly.
   A portable tank, meeting fire safety requirements for use with gasoline, shall be used to receive the gasoline dispensed during this test.
   The tank shall have sufficient volume so that at least 4.5 gallons may be dispensed prior to activating the primary shutoff mechanism of the dispensing nozzle. Tank material, likely to provide contact with the nozzle spout, or A/L adaptor, during the entire dispensing event, shall be constructed of aluminum or brass or other materials approved by the local fire codes for such application. The tank and required plumbing configuration is shown in Figure 3 and Figure 4.

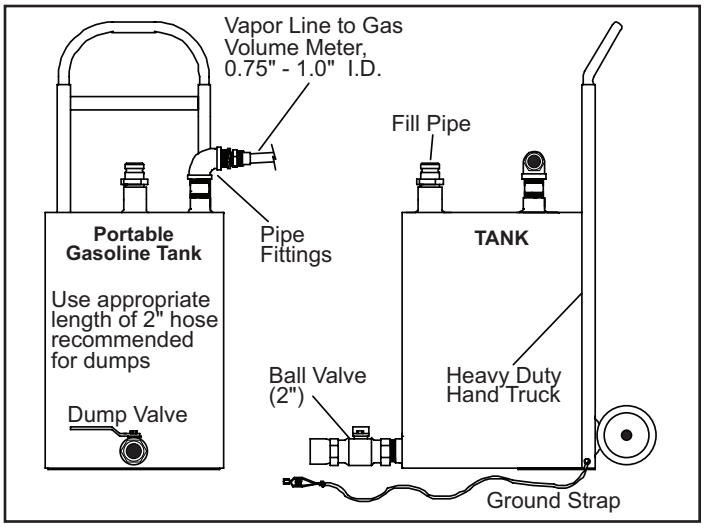


Figure 3: Portable Tank Assembly

This configuration permits a portion of the vapors displaced during testing to be returned to the gasoline storage tank. The minimum and maximum dimensions shown in Figure 3 and Figure 4 shall be adhered to in all cases.

6. Stopwatch. Use a stopwatch accurate to within 0.2 seconds.
7. Lubricant. Appropriate lubricant, either grease or spray lubricant, shall be used to ensure a leak-tight seal between the O-rings in the A/L adaptor and the nozzle spout.

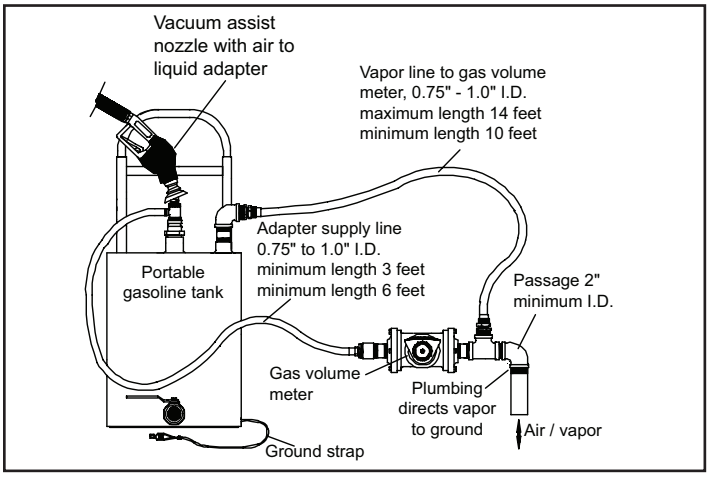


Figure 4: Assembled Air to Liquid Volume Ratio Test Equipment

Pre-Test Procedures

1. Assemble the portable tank assembly and gas volume meter as shown in Figure 3. The minimum and maximum dimensions shown in Figure 3 shall be adhered to in all cases. Ensure that the ground strap is properly connected to an acceptable ground.
2. If more than one nozzle share vacuum plumbing with the test nozzle, one troubleshooting method for a low A/L ratio is to seal all nozzles other than the nozzle being tested, e.g., plastic bags and tape or rubber bands. If leaks in the nozzles/check valves served by common vacuum pump cause the bags to deflate, the low A/L ratio may have been caused by a leak through an idle nozzle during the test. The A/L test to verify compliance, however, shall be conducted without ″bagging″ any of the nozzles.
3. The gas volume meter shall be calibrated, within 180 days prior to conducting this procedure. In addition, the meter shall be calibrated after any repairs or alterations to the meter. Calibrations, at a minimum, shall be conducted at flowrates of 30, 60, and 90 CFH (3.7, 7.5, and 11.2 gallons/minute) in accordance with one of the following:
   a. ARB Air Monitoring Quality Assurance, Volume VI, Standard Operating Procedures for Stationary Source Emission Monitoring, January 1979, or
   b. US EPA Quality Assurance Handbook for Air Pollution Measurement Systems, Volume III, Stationary Source Specific Methods, or
   c. EPA Method 2A, Measurement of Gas Volume Through Pipes and Small Ducts (40 CFR Part 60, Appendix A), or
   d. Appropriate calibration procedures in accordance with California Department of Food and Agriculture, Division of Measurement Standards and County Department of Weights and Measures (title 4, CCR, section 3.33).

Note: A copy of the most current calibration shall be kept with the meter.

4. A one-time test to verify proper design of the tee connection at the gas volume meter shall be conducted. Disconnect the A/L adaptor from the nozzle and dispense between four and one-half and five (4.5 - 5.0) gallons into the portable test can, insuring a tight fit at the nozzle spout/portable tank fill pipe. The design is acceptable if the displacement on the gas volume meter is less than 0.01 cubic feet.
5. Verify that the O-rings in the A/L adaptor, if applicable, are present and in good condition. O-rings with nicks, tears, or other deformations shall be replaced prior to the test. The O-rings shall be properly greased to ensure a vapor tight connection. Refer to the A/L adaptor manufacturer's instructions for recommendations. If the O-rings are lubricated before each test, the chance of an improper seal between the nozzle spout and the A/L adaptor is reduced. Conduct a pre-test leak check of the A/L adaptor by connecting the A/L adaptor to a surrogate spout as shown in Figure 5.

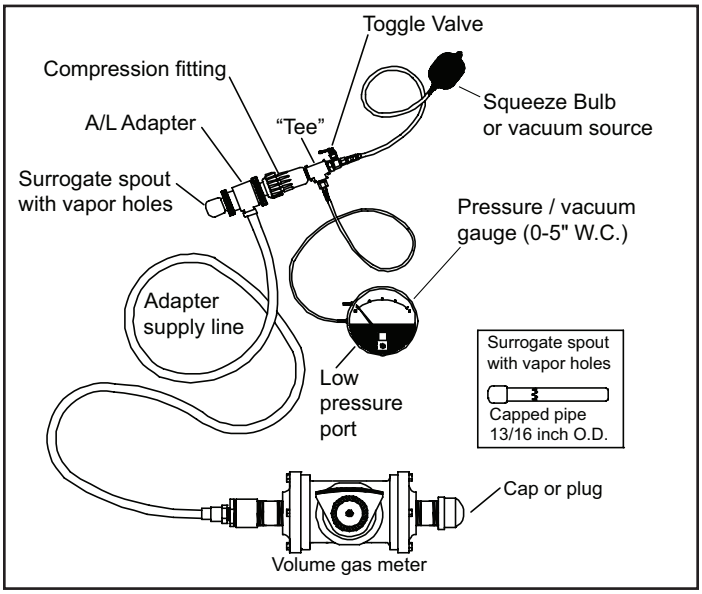


Figure 5: Air to Liquid Adapter Leak Test Assembly

Induce a vacuum of five inches H2O, gauge (5.00″ WCg). Start the stopwatch. The vacuum shall be at least 4.95″ WC after three minutes from the start of the leak check. Any test equipment which fails this pre-test leak check shall not be used to conduct A/L testing for the purpose of determining compliance.

6. This test procedure shall be conducted with the storage tank pressure / vacuum (P / V) valve(s) installed and the Stage I poppetted vapor coupler(s) in the closed position.
7. With the portable tank and A / L test equipment assembled, dispense between four and one-half and five (4.5 - 5.0) gallons into the portable tank. This provides to initially condition the portable tank with gasoline vapors. This initial conditioning shall be conducted once per facility, prior to beginning testing at each facility.

Test Procedures

1. Carefully connect the A / L adaptor to the nozzle spout as shown in Figure 2, isolating the vapor ports of the nozzle and insuring a tight connection.
2. Record the initial reading from the index of the gas volume meter on the A / L Field Data Sheet, as shown in the Form on page 19. This initial reading shall be taken before each test. Do not use the final reading from the preceding test as the initial reading for the current test, unless it has been verified. This is necessary since the meter index may have moved due to the low pressure drop through the meter.
3. Reset the stopwatch and, if appropriate, reset the totalizer on the dispenser.
4. Fully engage the nozzle trigger and begin dispensing into the portable gasoline tank. Ensure that the nozzle spout is in contact with the grounded tank assembly during dispensing. Start the stopwatch when the totalizer indicates dispensing has started.
5. Dispense between four and one-half (4.5) and five (5.0) gallons of gasoline. If the nozzle being tested introduces liquid into the test equipment, the A / L of that nozzle shall be deemed a failure.
6. Simultaneously stop both the stopwatch and gasoline dispensing.
7. The following data for each test shall be recorded on the A / L Field Data Summary:
   - Dispenser (pump) number
   - Gas grade
   - Nozzle model and serial number
   - Initial gas volume meter reading, in cubic feet
   - Initial totalizer reading from the dispenser, in gallons
   - Final gas volume meter reading, in cubic feet
   - Final totalizer reading from the dispenser, in gallons
   - Elapsed time during dispensing, in seconds

Note: Units other than cubic feet, gallons, and seconds may be used, provided that Equation shown under Calculating Results is appropriately modified.

For certification testing, the test data are used to determine the A / L Volumetric Ratio that is specified in the Theory of Operation section. For compliance testing, continue as described below.

8. If the A / L Volumetric Ratio, as determined by Equation shown in Calculating Results is within the limits specified in the Theory of Operation section, the refueling point complies with the specifications.
9. If the A / L Volumetric Ratio is outside the range specified by an A / L value of less than or equal to 0.10, conduct the test two additional times. Do not make adjustments to the gasoline dispensing or vapor recovery lines until all three test runs have been completed.

   Adjustments of the A / L test equipment, including the A / L adaptor and nozzle, is allowed as may be necessary to insure measurement accuracy. If the A / L test equipment is adjusted, then the prior test run results for that nozzle should not be used. Calculate the numerical average of the three test runs. If the average A / L value of these three test runs is within the allowable limits, compliance has been verified.

   If the resulting average is outside of the specified limits, the refueling point does not comply with the specifications. If the A / L Volumetric Ratio is outside the range specified by an A / L value of greater than 0.10, the refueling point does not comply with the specifications.
10. If more than one nozzle share vacuum plumbing with the test nozzle, one troubleshooting method for a low A / L ratio is to seal all nozzles other than the nozzle being tested, e.g., plastic bags and tape or rubber bands. If leaks in the nozzles / check valves served by common vacuum pump cause the bags to deflate, the low A / L ratio may have been caused by a leak through an idle nozzle during the test. The A / L test to verify compliance, however, shall be conducted without ″bagging″ any of the nozzles.
11. To avoid a build-up of gasoline, drain any condensed gasoline, periodically or after each test run, from the hoses between:
    a. the gas volume meter and portable tank assembly, and
    b. the A / L adaptor and gas volume meter.

Post-Test Procedures

1. Remove the A / L adaptor from the nozzle.
2. Drain the dispensed product into the appropriate gasoline storage tank at the facility. Ground the portable tank assembly to the storage tank before draining. Do not mix product grades in the portable tank assembly without approval of the facility owner and use caution to drain the portable tank into the correct facility storage tank. If blending valves are utilized to produce product grades which do not have a dedicated storage tank, product from the blended grade shall be returned to the lower octane tank.
3. At the conclusion of testing at the facility, conduct a post-test leak check of the A/L adaptor by connecting the A/L adaptor to a surrogate spout as shown in Figure 4. Raise the test pressure to five inches H2O, gauge (5.00″ WCg). Squirt liquid leak detector solution on interfaces and other potential leak sources while watching for the formation of bubbles. There shall be no formation of bubbles, or a drop in pressure below 4.95″ WC for three minutes from the start of the test. The data collected during the A/L testing is invalid if the test equipment fails this post-test leak check.
4. Prior to transportation, the inlet and outlet of the gas volume meter shall be carefully sealed to prevent foreign matter from entering the meter.
5. At the conclusion of testing, the portable tank shall be transported in accordance with all applicable safety requirements.

Calculating Results

The A/L Volumetric Ratio equation:
A/L = [y(Vf – Vi) / Gf – Gi] x 7.481

Where:

A/L = Air to Liquid Volumetric Ratio, dimensionless

y = Correction factor for gas volume meter. (See the correction factor equation).

Vi = Initial gas volume meter reading, cubic feet

Vf = Final gas volume meter reading, cubic feet

Gi = Initial totalizer reading from the dispenser, gallons

Gf = Final totalizer reading from the dispenser, gallons

7.481 = Conversion factor from gallons to cubic feet, gallons per cubic foot

The gasoline dispensing rate during the A/L test shall be calculated as shown inGasoline dispensing rate equation.

Gasoline dispensing rate equation:
Qg = [Gf – Gi / t] x 60

Where:

Qg = Gasoline dispensing rate, gallons per minute

Gi = Initial totalizer reading from the dispenser, gallons

Gf = Final totalizer reading from the dispenser, gallons

t = Elapsed time during dispensing event, seconds

60 = Conversion factor, seconds per minute

The correction factor for correcting observed values of the gas volume meter shall be calculated as shown in the correction factor equation.

Correction factor equation:
y = [Vr / Vm]

Where:

y = Correction factor for the gas volume meter's observed reading, dimensionless

Vr = True volume from current calibration of gas volume meter, cubic feet

Vm = Corresponding observed reading from gas volume meter, cubic feet

Maintenance Instructions

Scheduled Maintenance

Weekly Inspection and Testing

- Inspect each nozzle, hose, and breakaway for damage, loose connections, or leaks. Inspect nozzles for damaged vapor boots or spouts. Any nozzle with a vapor collection boot which is missing, or which has one half of the mini-boot faceplate or greater missing should be replaced or repaired as soon as practicable. Spouts with visible damage must be replaced.
- Inspect hoses for wear, severe kinks, cracks, and splitting. Replace if wire braid is visible.

Quarterly Inspection and Testing

- Perform Weekly Inspection prior to Quarterly inspection.
- Check product dispensing flow rate at maximum (handheld) dispensing position. Verify flow rate is between 6.0 GPM and 10.0 GPM.
- Replace dispenser filters when flow rate is below 6.5 GPM and check flow rate again. If the flow rate does not increase after filter change, remove the fueling point from service.
- If flow rates exceed 10.0 GPM, install the Healy Model 1301 Flow Limiter and check flow rate again. If flow rate still exceeds 10.0 GPM, remove the fueling point from service.

Annual Inspection and Testing

- Perform weekly and quarterly inspection prior to Annual Inspection.
- Conduct A/L test on all nozzles by following Air to Liquid Ratio Testing from the Testing Instructions section of this manual.

Field Repair/Replacement Instructions

Boot Assembly Replacement for 700 Series Nozzles

1. To remove the old Mini-Boot, unscrew the 700 boot assembly clamp and remove.
2. Grip the boot assembly and rotate back and fourth a maximum of 5 degrees in each direction while gently pulling to separate the boot assembly from the nozzle.

Installing the Nozzle Model 708 Boot Assembly

1. To install, simply slide the new boot assembly twisting/pushing motion.
2. Install a boot assembly clamp and tighten securely,
3. Being sure to align the ″HEALY″ line on the Mini-Boot with the top center of the nozzle.

Installing the Nozzle Model 709 Boot Assembly

Note: Heating the boot assembly in warm water softens the material, making it easier to install.

1. Align the push rod extending from the nozzle end of the nozzle Model 709 boot assembly with the 1/16″ hole in the spout body while also aligning the 3/16″ hole in the hose clamp groove with the 3/16″ pin on the spout body Figure 6.

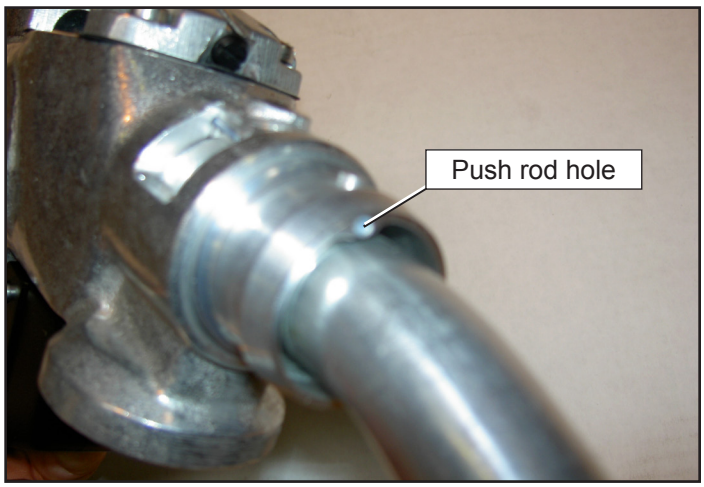


Figure 6: Push Rod Hole Location

2. Use a push rod checking tool (.050 hex wrench or 1/16″ drill bit) to verify that a clear hole condition exists in the push rod hole of the spout body before proceeding.
3. Start the push rod into the 1/16″ hole and slide the boot assembly axially into engagement with the spout body and the boot assembly location pin while limiting angular rotation of the boot to 5° in each direction to avoid bending the push rod.

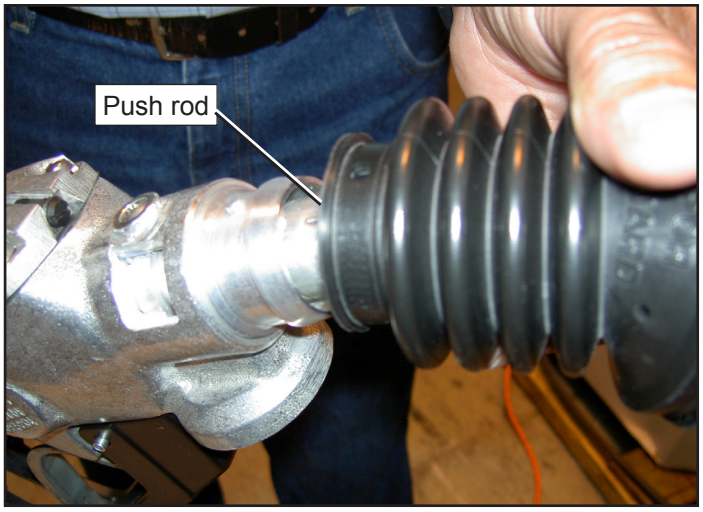


Figure 7: Aligning Push Rod

4. Install the hose clamp and tighten securely. Verify that the ″HEALY″ logo on the boot assembly is aligned with the top center of the nozzle.

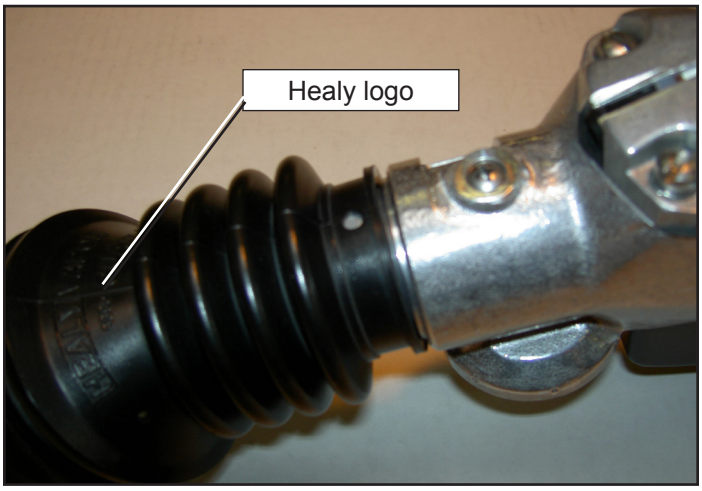


Figure 8: Aligning Boot

5. Verify that the nozzle will not dispense fuel when the dispenser is authorized and the boot assembly is in a free state.
6. Verify that the nozzle will dispense fuel when the dispenser is authorized and the nozzle spout is inserted into a vehicle fill-pipe to a position 1/8″ short of locking the spout anchor ring over the rim of the fill-pipe opening.

Healy 700 Series Nozzle Spout Replacement

1. Remove the boot assembly using the procedure from the boot assembly replacement section of the maintenance instructions from this manual
2. Use a Phillips Screwdriver to remove the pan head Spout Screw & O-ring holding the spout in place.
3. With the screw removed, using a maximum twisting motion of 15° in each direction, separate the nozzle body and the spout. Be sure that the 3 O-rings from the discarded spout assembly do not remain in the nozzle body. There is a 4th O-ring, furthest from the opening that remains inside the nozzle. Leave this O-ring in place.

Installing the New Spout

1. Install the new O-rings on the new spout with a light lubricant.
2. Use the 6206-OR Spout O-Ring Kit.
3. Lubricate the O-rings with oil. Carefully insert the spout into the nozzle, lightly pushing together until the spout aligns itself and resistance is felt. Using a maximum twisting motion of 15° degrees and light pressure, slide the pieces together, seating the O-rings and aligning the screw threads in the spout housing with the hole in the nozzle casting.
4. Install the new pan head spout screw, o-ring, and tighten securely to 12 inch pounds.
5. Install the boot assembly using the steps detailed in the installing the boot assembly replacement procedure listed in the maintenance instructions from this manual.

Testing the New Spout

All spout replacements must be tested to insure the installation has been completed correctly.

Note: The Model 709 nozzle will not dispense while authorized unless the boot assembly is manually compressed.

1. Dispense product into a container deep enough to cover the small hole near the tip of the spout. While dispensing, immerse the spout until the hole is covered and attempt to dispense product. The nozzle should shut off.
2. Repeat two more times to be assured that the auto shutoff feature is working properly. There should be no hesitation to the shutoff. It should be quick and positive. If the shutoff does not occur, turn off the dispenser, remove the spout, and check the O-rings. Replace the O-rings as necessary.

Healy Nozzle Scuffguard Replacement

1. Remove the boot assembly using the procedure listed in the maintenance instructions from this manual.
2. Slide a long screwdriver under the scuffguard in the area of the main valve cap nut on the top of the nozzle.
3. Pry upward to clear the top of the cap and then pull steadily over spout to remove.
4. Installation is the reverse of this method. It works best with the butt of the nozzle held in a vise. In cold weather the scuffguard may not be flexible enough to use the above method, carefully (do not damage the nozzle) cut the old scuffguard off with a knife and replace it with a new scuffguard by using the reverse of the step above.
5. Install the boot assembly using the procedure listed in the maintenance instructions from this manual.

Healy Nozzle Handle Cover Replacement

1. Grasp the lower edges of the handle cover and pull the cover off with an upward motion.
2. Installation is the reverse of this procedure. Be sure the pointed wings on the front of the cover are slid under the scuffguard.

Healy Nozzle Handguard Replacement

1. This is best done with the nozzle detached from the hose. The front and rear guard pins must be removed. Back up the head side of the pin with a suitable socket and drive out the guard pins using a 3/32″ drive pin punch or equivalent. The spring-loaded hold-open clip will pop out when the rear pin is removed. Be sure to observe the orientation of the spring so it can be properly reinstalled.
2. Remove the handguard carefully. The lever will drop down and the lever pivot pin will be free and could possibly slide out. Place the new handguard into position and install a new front guard pin through the handguard. Do not peen at this time.
3. Install a rear guard pin through the handguard and the first ear on the casting.
4. Put on the hold-open clip and push the pin through its first ear. Slide the coil spring into position with the ″hook″ on the hold-open clip. Push in the spring so the pin passes through the coil and into the other ears on the clip and casting. Be sure the hold-open clip properly latches the lever before peening-over the free ends of the two pins.

Healy Nozzle Lever Replacement

1. Remove the handguard following instructions in the nozzle handguard replacement instructions in the maintenance instructions section of this manual to expose the lever. There is a washer around the plunger under the lever. Observe how these are installed and be sure to re-use them with the new lever.
2. With the lever released, the white plunger will pull back towards the casting and make it difficult to re-install the pin on a new lever. Use a small screwdriver to reach through one mounting hole in the new lever and engage the hole in the plunger. Push the blade through the plunger, align the two holes, insert the pin, and remove the screwdriver to retain the lever.
3. Replace the handguard following detailed information from the nozzle handguard replacement instructions listed in the maintenance instructions section of this manual.

Drive-off Breakaway Reconnection Procedure

Use this procedure to either reconnect or disconnect (reverse order) the Healy 8701VV Breakaway.

Note: Breakaway reconnections are recommended to be logged in the (GDF) gas dispensing facility maintenance log.

1. Inspect each half of the separated breakaway for obvious damage to the outer-shell, plastic inserts or O-rings; including cracks, chips or tears that may effect reconnecting the two halves.

Figure 9: Breakaway Clamp Installed

2. Check the shear pin bushing hole (Figure 10) located in the top half of the breakaway for any part of the pin left behind at separation. A gentle tap on the opposite side of the breakaway should eject the pin.
3. After completing inspection, lightly lubricate the main o-ring on the top half of the breakaway. Any weight motor oil is acceptable.
4. Slide the top clamp of the breakaway reconnection clamp onto the two flat surfaces on the top half of the breakaway installed on the dispenser (attached to whip hose).
5. Slide the separated bottom half of the breakaway (with hose and nozzle attached) onto the bottom clamp of the breakaway reconnection clamp and begin squeezing the grip to slowly bring the two halves together. Check the main o-ring for position as the top and bottom of the breakaway come together.
6. Align the dowel pin in the bottom half of the breakaway with the dowel pin guide located in the top half of the breakaway (Figure 10). When the dowel pin and guide are aligned, continue squeezing tool grip until the breakaway halves join together.

Figure 10: Breakaway Installation

Caution **Reconnection can cause a small amount of gasoline to leak out of the breakaway. A towel wrapped loosely around the breakaway can help to minimize fuel spills.**

7. Remove the shear pin located in the spare shear pin location of the breakaway and install in place of the original.
8. Torque the shear pin to 20 inch-pounds. DO NOT OVER-TIGHTEN.
9. If available, install a shear pin in the spare shear pin location.
10. Remove the breakaway reconnection clamp.

Healy Model 75 Series Inverted Coaxial Hoses

Healy 75 Series Hoses and Hose Assemblies should be serviced by a Healy Certified Technician. Hoses should be inspected for kinks, flat spots, abraded outer cover (wire strands visible) and leaking fittings on a weekly basis.

Note: The following procedures shall be conducted after installation or repair, with the dispenser authorized and ready to dispense fuel.

Field Serviceable Hose Components

- Healy HB-2 O-ring (Item A, in Figure 11). This o-ring seals the fitting to the nozzle and the adaptor. Liquid gasoline visible on the hose indicates a damaged or improperly installed HB-2 o-ring. Replace the o-ring, if necessary.
- Healy HB-4 Quad Seals (Item B, in Figure 11). These quad seals are used on the end of the hose that attaches to the breakaway assembly (or flow limiter, if equipped). If the symptom is meter creep (gallons dispensed display on dispenser is counting up when the nozzle is not dispensing gasoline), check the HB-4 quad seals at the breakaway (or flow limiter, if equipped) end of the hose for cuts or damage. Replace the seals, if necessary.
- Healy 291 O-ring (Item C, in Figure 11). These o-ring seals are used on the end of the hose that attaches to the nozzle or hose adaptor assembly. If the symptom is meter creep (gallons dispensed display on dispenser is counting up when the nozzle is not dispensing gasoline), check the 291 O-rings at the nozzle or adaptor end of the hose for cuts or damage. Replace the seals, if necessary.
- Lubricate any o-ring or quad seal before installing the hose assembly into an adaptor, breakaway, or nozzle assembly to make it easier to install and prevent the seal from getting cut. Motor oil (any weight) is acceptable for lubricating an o-ring or quad seal.

Figure 11: Coaxial Hose

DF Name and Address _____ _____ _____	**A/L Field Data Sheet**	Testing Firm Name and Address: _____ _____ _____ Phone No. ( )
Test Date/Time:		Test Performed by:
Pre-Test Leak Check: Initial/Final Pressures, in. H_2O _____ / _____ **Post-Test Leak Check:** Initial/Final Pressures, in. H_2O ___ _ / _____	Source: **GDF Stage II Vapor Recovery** **GDF #** _____ **Permit #** _____	VN Recommendation: Y/N _____ Allowable A/L Range _____

Pump #	Gas Grade	Nozzle Model & Serial #	Initial Totalizer, Gallons	Final Totalizer, Gallons	Gas Pumped, Gallons	Time, Seconds	Dispensing Rate, Gpm	Starting Meter Reading	Ending Meter Reading	A/L

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HEALY

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