

# SERAPHIN® SLIP-ON UNIT WITH PROVER

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## **OPERATING AND MAINTENANCE INSTRUCTIONS**

**Seraphin® Test Measure**  
A Division of Pemberton Fabricators, Inc.  
Rancocas, NJ



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**Description:**

The Seraphin Slip-on with prover is a mobile proving system designed to calibrate gasoline and diesel fuel dispensers. It is comprised of (3) precision volumetric stainless steel bottom drain special J provers connected each to their own individual 80 gallon SS holding tank with a 50 Gallon Series J prover is installed above the holding tanks for testing high speed diesel dispensers. The 80 gallon configuration allows for up to 48 (5-gallon) or 6 (50 Gallon) calibration tests before returning to the fuel station's storage tank for dumping. The prover drain valve is plumbed to piping via butterfly valves to the gravity drain.



**WARNING:** *Secure the Slip-on unit to the bed of the pick-up truck, so that the unit does not shift during driving and stopping. Seraphin® Test Measure recommends the use of safety railings on the truck to prevent operators from accidentally falling from the unit's upper level.*

**Set-up Procedure for calibration with 5 gallon special J prover:**

1. Electrically ground the calibration trailer, to a proper earth ground, using the 50 ft. of grounding cable enclosed in a retractable reel which is mounted to the floor of the trailer body. This will dissipate any static electricity that could be generated during the filling of the prover.



**Stop Static.**

**WARNING:** *The prover/trailer system must be properly grounded prior to conducting petroleum measurement testing to prevent possible static electricity from sparking which could ignite a flammable product. Follow all safety measures.*

2. Remove the (3) cotter pins from the locking bracket and slide the “U” bracket out so that the provers can be free standing and able to be leveled individually.
3. Close all 3 prover drain valves and 3 holding tank gravity drain valves.
4. Remove the Vapor Cap from the top of the prover neck, exposing the neck opening.

5. Visually inspect, from the top neck opening, the interior of the prover to ensure it is free of debris which could affect the accuracy of the liquid volume measurement.

**Prover Wetting Procedure:**

1. If the prover is clean and free of debris, fill the prover with liquid from the meter device being checked. Fill the prover until the amount on the meter reads the nominal capacity of the prover.

**NOTE:** *The prover must be filled once and drained in order to wet the internal sides of the prover body. Wetting the internals of the prover helps ensure consistency in the amount of liquid that clings to the sides, from one test to the next.*

2. Open the prover drain valve to drain the prover into its holding tank. Once the cessation of main flow breaks, as viewed through the sight flow indicator, wait 30 seconds and then close the drain valve.
3. The prover is now wet down and is ready for an official test.

**Conducting the Calibration with the 5 gallon special J prover:**

1. Fill the prover until the amount on the meter reads the nominal capacity of the prover.
2. Level the prover on its leveling ball joint until the bubble in the circular level is in the center circle.
4. Compare the reading on the graduated scale to the meter reading. Document or record the difference in readings.
5. Open the prover drain valve. Once the cessation of the main flow breaks, wait 30 seconds and then close the drain valve.



**CAUTION:** *Ensure the tank gravity drain valve is closed when draining the prover into the tank, to avoid the possibility of fuel spillage.*

### Gravity draining of the 80 gallon holding tanks:

1. Ensure tank gravity drain valve is completely closed.
2. Connect the 2” petroleum drain hose (provided with the vehicle) to the tank gravity drain quick connect fitting, for the tank you wish to drain. Adjusting the manifolded butterfly valves as needed to drain each tank or open for all tanks.
3. Route the hose to the below ground storage tank inlet piping.



**CAUTION:** *Place traffic cones around the storage tank inlet and the drain hose to alert motorists in the station of the hazard and that work is in progress.*

4. Open the gravity drain isolation valve.
5. Ensure the gravity drain hose is attended at all times when draining to ensure it stays in the storage tank inlet until completely drained.
6. Once the tank is completely drained, close the holding tank gravity drain valve.



**CAUTION:** *Ensure all fuel residual is drained from the hose into the underground storage tank prior to lifting the hose from the storage tank inlet.*

7. Disconnect the petroleum drain hose from the holding tank gravity drain connection.



**CAUTION:** *Disposal of drained fluid should be done in an environmentally safe and responsible manner in accordance with good industry practices and in compliance with OSHA regulations*

8. Stow the drained hose, secure the provers with the (3) locking brackets making sure to replace the cotter pins and replace vapor caps.

### Conducting a Proving Run with the 50 Gallon Series J Prover:

1. Close the Series J prover drain valve.
2. Perform the wet down procedure on the prover.

### Prover Wetting Procedure:

1. If the prover is clean and free of debris, fill the prover with liquid from the meter device being checked. Fill the prover until the amount on the meter reads the nominal capacity of the prover.

**NOTE:** *The prover must be filled once and drained in order to wet the internal sides of the prover body. Wetting the internals of the prover helps ensure consistency in the amount of liquid that clings to the sides, from one test to the next.*

2. Open the prover drain valve to drain the prover into the underground storage tank through the gravity drain line. Once the cessation of main flow breaks, as viewed through the sight flow indicator, wait 30 seconds and then close the drain valve.
3. The prover is now wet down and is ready for an official test.

### Testing Procedure:

1. Record the meter register, or zero the prover counter if one is being used.

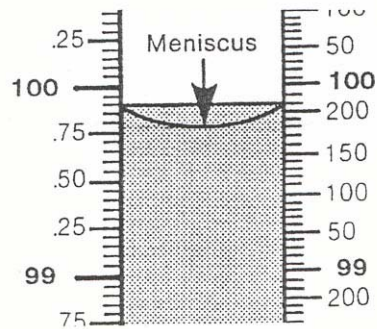


**Stop Static.**

**WARNING:** *The prover system must be properly grounded prior to conducting petroleum measurement testing to prevent possible static electricity from sparking which could ignite a flammable product. Follow all safety measures.*

2. If a flammable liquid is being tested, ensure the prover is grounded to a proper earth ground using a grounding cable and clamp (to eliminate static electricity build-up).
3. Check and adjust the leveling device(s) to ensure that the prover is level and verify that the prover drain valve is closed.

4. Fill the prover using the dispensing equipment until the meter being checked reads the nominal capacity of the prover.
5. Identify the volume measurement on the scale by reading the meniscus in the gauge glass. Look directly from eye level to a horizontal line tangential to the bottom of the meniscus. Record the result.



6. Drain the prover by opening the bottom drain valve. Once the main flow breaks, drain the prover for an additional 30 seconds and close the valve. This is necessary to provide a consistent “to deliver” condition.
7. Perform a second measurement by repeating the procedure in 3. through 6. above. Compare the meter reading to the volume observed on the scale. The two successive measurements should agree with the meter tolerance specifications of the meter manufacturer.



**CAUTION:** *Disposal of drained fluid should be done in an environmentally safe and responsible manner in accordance with good industry practices and in compliance with OSHA regulations*

8. If excessive disagreement is observed, check the dispenser and the prover for leakage and cleanliness and repeat the procedure until the results of two successive runs repeat within acceptable tolerance



**CAUTION:** *Disposal of drained fluid should be done in an environmentally safe and responsible manner in accordance with good industry practices and in compliance with OSHA regulations*

**Operation:****Reference:**

For officially recognized petroleum measurement procedures and methods—reference:

- NIST Handbook 44 Specifications, and Tolerances, and other Technical Requirements for Weighing and Measuring.
- API Manual of Petroleum Measurement Standards, Chapter 4, Section 4 (Tank Provers) and Section 8 (Operation of Proving Systems).

**Care and Maintenance of Provers**

1. Check provers, valves and piping periodically for dents and leaks at the seams, joints, connections and gauge assembly. If a leak is detected, call SERAPHIN® for authorized repair parts.



# Terminology

**Bottom loading:** Method of filling a volumetric vessel. Intake is made with a bottom load adapter.

**Capacity, nominal:** The nominal capacity of a field standard test measure or prover is the volume used to designate the measure or prover. The volume is determined by the nominal mark on a graduated upper neck gauge and between the nominal mark on the graduated upper neck gauge and the lower shut off valve or zero mark on a lower neck gauge on a prover.

***NOTE:** The nominal capacity of the prover has be set at the Seraphin® facility using Standards that are traceable to the National Institute of Standards and Technology (NIST). If uncertainty values or a higher order of calibration is needed the unit should be sent to a certified calibration laboratory.*

**Cubical coefficient of thermal expansion:** Three dimensional expansion or contraction of a material due to temperature change, expressed °C<sup>-1</sup> or °F<sup>-1</sup>

**Field standard test measure:** A measure that can be hand held and is usually less than 40 Liters (10 Gallons).

**"High Resolution" standard:** A standard with a small diameter neck for improved resolution in reading the meniscus. Generally used in the laboratory as a standard or check standard for measurement control of a primary standard.

**Main flow cessation:** The moment when a full discharge stream "breaks" and becomes a trickle or a drip.

**Prover:** Bottom drain is implied. Filled from the top or bottom loading, depending on intended use. May be free standing, mounted permanently, or on truck or trailer and not hand held.

**Reference temperature:** The temperature at which the measure is intended to contain or to deliver its nominal capacity.

**Sight-flow-indicator:** A fitting with windows to visually observe the flow through a pipe.

**Submerged fill pipe:** Pipe used in top filling to minimize foaming of liquids, such as fuel oil and milk, by discharging the product into the bottom of a prover.

**To contain:** An indication that the standard is adjusted to contain its intended volume when filled from its empty condition at a reference temperature. (the empty condition is "dry" and test measures or provers are generally not used in this condition).

**To deliver:** An indication that the standard is adjusted to deliver its intended volume at a reference temperature. Provers used in a "wet" condition are marked To Deliver.

**Tolerance:** Maximum permissible error. A value fixing the limit of allowable error or departure from the true performance or value.

**Vapor recovery:** A system for entrapping and collecting vapors for return to the tank to prevent expulsion into the atmosphere.

# SAFETY

The use of a test measure or prover standard may involve hazardous materials, operations, and equipment. Seraphin does not purport to address all safety problems associated with the use of each product. It is the responsibility of the user of the standard to establish appropriate safety and health practices and determine the applicability of local and federal regulatory limitations prior to use. Specific safety information is documented in the various trade references (e.g. American Petroleum Institute and Petroleum Equipment Institute).

Commercial liquid measuring devices, tested with provers, are typically used to measure quantities of petroleum products. Petroleum products are known hazardous materials and hazardous wastes. The user is encouraged to obtain Material Safety Data Sheets (MSDS) from the manufacturer of any product encountered. Federal, state and local safety and disposal regulations concerning hazardous materials encountered should be reviewed by the user.

Safety devices and locks should be installed to prevent inadvertent operation of, or unauthorized tampering with, equipment. All automated or power-operated meter proving systems should have emergency manual operators for use during an accident or power failure. Grounding devices should be provided to protect against electrical shock or static discharge in both tank prover and \ electrical instrumentation.

All electrical connections must be explosion proof. All wiring, including low voltage wiring shall meet the requirements of Article 300, 500, Group D, Class 1, Division 1, and 250.45 and/or other applicable articles of the latest edition of the National Electrical Code.

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The warranty for the equipment proposed is as stated in the above paragraphs. It is not re-stated--nor does it appear in any other form.