SERAPHIN® MOTOR FUEL CALIBRATION TRAILER

OPERATING AND MAINTENANCE INSTRUCTIONS

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

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PEMBERTON FABRICATORS, INC.

RANCOCAS, NJ, U.S.A.

Description:

The Seraphin Motor Fuel Calibration Trailer 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 115 gallon holding tank in the rear of the trailer and a Series J prover is installed above the holding tanks on the trailer for testing high speed diesel dispensers. The prover drain valve is plumbed to piping that can be routed via butterfly valves to a gravity drain or to a pump. A manual hose reel, with 30 ft. of hose and nozzle, is connected to the pump. The hose is used to route the petroleum to an above ground storage tank or up into a tank truck.

Set-up Procedure for calibration with 5 gallon/20 liter 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.

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/20 liter 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 115 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.

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 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.

Draining the Series J prover through the Pump-Off System:

1. Ensure the prover drain valve is completely closed.

2. Verify that the gravity drain to the gravity drain quick connect coupling is closed.

3. Pull off as much hose as needed from the hose reel to reach the above ground storage tank or tank truck inlet. Stick the hose nozzle in the storage tank receptacle. Be sure someone is attending the nozzle or that it is safely secured in place so as not to allow it to accidentally fall out, potentially causing a spill.

4. Open the Prover drain valve allowing petroleum to reach the pump inlet.

WARNING: *Always use caution when working with electrical circuits – Failure to use caution can result in serious personal injury or death.*

5. Turn on the pump.

6. While draining, visually observe the flow of the petroleum through the sight glass just down stream of the prover drain valve. Once the main flow stops, then after 30 seconds close the prover drain valve.

7. Turn off pump when all fuel is drained from the interconnect piping.

Testing Procedure:

1. Ensure the trailer is grounded to a proper earth ground using the retractable grounding cable attached to the trailer.

2. Verify that the prover drain valve is closed.

3. Fill the prover until the meter being checked reads the nominal capacity of the prover.

4. Compare the volume amount read on the meter to what the actual volume is on the scale and record the difference.

5. Drain the prover back to a storage tank via gravity drain or through the pump-off system as outlined in the procedure above.

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 pump, 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.

Maintenance and Care of Seraphin® Trailers

Tires

1. Make sure the trailer tires and wheels are of the same size, type tread design and load carrying capacity. Differences may adversely affect trailer handling and could increase a risk of loss of vehicle control.

2. Carefully observe tire inflation pressure each day, when cool, before you drive. Failure to maintain the proper recommended pressure can adversely affect the way your trailer handles. If one tire looks lower than the others, use a tire gauge to check pressure, and adjust if required. Check the tire pressure every few weeks (including spare).

WARNING: *Under-inflation is the most common cause of tire failures and may result in severe tire cracking, tread separation or "blowout", with unexpected loss of vehicle control and increased risk of injury. Under-inflation increases sidewall flexing and rolling resistance, resulting in heat buildup and internal damage to the tire. It may also result in unnecessary tire stress, irregular wear, loss of vehicle control and accidents. A tire can lose up to half of its air pressure and not appear to be flat!*

3. Periodically inspect the tire threads and remove stones, nails, glass or other objects that may be wedged in the tread grooves. Check for holes or cuts that may permit air leakage from the tire and make necessary repairs.

4. Inspect the tire sidewalls for cuts, bruises and other damage. If internal damage to the tire is suspected, have the tire demounted and inspect in case it needs to be repaired or replaced.

Lights

1. Make sure that all running lights, brake signals and hazard lights are working.

2. To replace trailer lamps, carefully pull the lamp from the assembly, remove the defective bulb from the socket and replace with a similar bulb.

Brakes

1. Inspect brake shoes periodically and check clearance – adjust as necessary.

Axle

1. Inspect bearings for grease and repack as necessary.

Hitching the Trailer to the Truck

1. Park the trailer on a level surface. Crank the front jack to an appropriate height, above the vehicle's hitch. Lower the jack, adjusting the ball and the hitch so that the tongue securely fastened.

2. Raise the tongue jack high enough so that it can not hit while being transported

3. Connect the safety chains to the hook retainers of the vehicle hitch. To connect the trailer's safety chains, cross the chains under the trailer tongue and allow slack for turning corners. **Do not attach safety chains to the bumper.**

Vehicle Loading

1. Properly loading your trailer will provide maximum return of trailer design performance. The maximum recommended loaded trailer weight, GVWR (Gross Combined Vehicle Rating) is the highest possible weight of a fully loaded trailer. You can find this listed on the trailer identification plate on the tongue of the trailer.

2. The GCW (Gross Combined Weight) is the weight of the loaded vehicle (GVW) plus the weight of the fully loaded trailer. The GCW (Gross Combined Weight) must never exceed the GCWR (Gross Combined Weight Rating) which can be found by consulting your truck dealership or in the truck owners guide.

WARNING: *Do not use replacement tires with lower load carrying capacities than the originals because they may lower the trailer's GVWR limitation Replacement tires with a higher limit than the originals do not increase the GVWR..*

3. Towing a trailer places an additional load on your vehicle's engine, transmission, axle, brakes and suspension. Inspect these components carefully prior to and after any towing operation

Maintenance and Care of Pumps

General Safety

1. Read the instruction, Operation and Maintenance Manual for your pump before installing, operating or performing maintenance on the pump or its related equipment.

CAUTION: *Remember that pump safety is the responsibility of the user. Failure to comply with advised safety rules can lead to injuries and/or damage to equipment*

2. Overheated pumps can cause severe burns and injury. If overheating of pump casing occurs:

   a) Stop pump immediately.

   b) Allow pump to cool to air temperature.

   c) Slowly and cautiously vent pump at drain plug.

   d) Refer to Manufacturer's Installation, Operation and Maintenance Manual before restarting.

3. Do not operate pump without all guards and shields in place.

4. Cautiously approach any pump that has been in operation.

5. Pump only liquids for which the pump was designed.

6. Do not pump flammable or corrosive liquids unless pump and piping are designed for such.

7. Operating pump with suction and/or discharge closed is one cause of severe overheating.

8. Note direction of rotation - operating pump in wrong direction may cause impeller to unscrew and damage pump casing or other pump parts.

9. Locate the pump in an accessible location, as close as safely possible to the liquid to be pumped.

10. Check all lubricants before installation and operation and in accordance with maintenance programs.

11. When lifting pumps, use only lifting equipment in good repair with adequate capacity.

12. Never operate a self-priming pump unless the pump casing is filled with liquid. Doing so may damage the pump. The pump will not prime unless the pump casing is filled with liquid.

CAUTION: *Never operate a self-priming pump unless the pump is filled with liquid. This can damage the pump.*

13. Do not remove the coverplate, fill port cap, gauge port plug, or drain plug from any overheated pump. Allow pump to cool to air temperature. Check pump temperature before opening coverplate, fill port, gauge port plug or drain plug.

14. Do not operate pump against a closed valve.

15. Check the suction strainer regularly to be sure that it is not clogged.

16. Secure the pump so that it cannot move after it is in its operating position.

17. Never operate pumps in explosive or volatile atmospheres unless they are designed to be operated in these environments.

18. Check the pump thoroughly upon delivery for any shipping damage.

19. Never wear loose clothing around machinery.

20. Always read and keep the Installation, Operation and Maintenance Manual for your pump.

21. When overhauling pumps, never remove or cover warning tags and labels.

22. Be sure that only experienced personnel operate machinery.

23. Before working on pumps with electric motors and panels, LOCK control panel in the OFF position:

    a) If control panel cannot be locked, pull main fuse or circuit breaker.

    b) Remove all V-belts.

    c) Disengage drive coupling.

24. Drain pump completely of water before freezing weather.

25. Do not work in underground pump systems alone or without adequate ventilation

Terminology

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

Capacity, nominal: **T**he 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 $°C^{-1}$ or $°F^{-1}$

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.

SERAPHIN® TEST MEASURES
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