



Offshore Operators Committee LACT and Gas Sales Meter Sealing Best Practices

This is a Best Practice document that was a result of the OOC
Measurement / Metering Workshop.

2016



Outline

- Objective
- Regulations
- Example: Bypass Piping of Gas Measurement Skid
- Example: LACT Unit
- Quantity System Seal Requirements
 - PD Meters, Turbine Meters, Flow Computer / Data Averaging Device, Sales / Inventory Tanks
- Quality System Seal Requirements
 - Sampling Systems
- Examples of Some Acceptable Sealing Methods



Objective

- This document is intended to provide industry best practices for sealing to achieve compliance with BSEE regulations.
- The intent of sealing is to achieve security and assure accurate measurement during custody transfer of royalty bearing production.
- Purpose of sealing is to prevent unintentional or intentional tampering, falsifying or mishandling the quantitative and qualitative production for custody transfer.



Regulations

- TITLE 30--MINERAL RESOURCES DEPARTMENT OF THE INTERIOR
- PART 250--OIL AND GAS AND SULPHUR OPERATIONS IN THE OUTER CONTINENTAL SHELF--Table of Contents
- Subpart L--Oil and Gas Production Measurement, Surface Commingling, and Security
- Sec. 250.1200 Question index table.
- The table in this section lists questions concerning Oil and Gas Production Measurement, Surface Commingling, and Security.



Sec. 250.1201 Definitions

- Inventory tank--a tank in which liquid hydrocarbons are stored prior to royalty measurement. The measured volumes are used in the allocation process.
- Royalty meter--a meter approved for the purpose of determining the volume of gas, oil, or other components removed, saved, or sold from a Federal lease.
- Royalty tank--an approved tank in which liquid hydrocarbons are measured and upon which royalty volumes are based.
- Seal--a device or approved method used to prevent tampering with royalty measurement components.



Sec. 250.1202 Liquid Hydrocarbon Measurement

(b) What are the requirements for liquid hydrocarbon royalty meters? You must:

- 1) Ensure that the royalty meter facilities include the following approved components (or other BSEE-approved components) which must be compatible with their connected systems:
 - (i) A meter equipped with a nonreset totalizer;
 - (ii) A calibrated mechanical displacement (pipe) prover, master meter, or tank prover;
 - (iii) A proportional-to-flow sampling device pulsed by the meter output;
 - (iv) A temperature measurement or temperature compensation device; and
 - (v) A sediment and water monitor with a probe located upstream of the divert valve.



Sec. 250.1202 Liquid Hydrocarbon Measurement (cont.)

- 2) Ensure that the royalty meter facilities accomplish the following:
 - (i) Prevent flow reversal through the meter;
 - (ii) Protect meters subjected to pressure pulsations or surges;
 - (iii) Prevent the meter from being subjected to shock pressures greater than the maximum working pressure; and
 - (iv) Prevent meter bypassing.



Sec. 250.1202 Liquid Hydrocarbon Measurement (cont.)

3) Maintain royalty meter facilities to ensure the following:

- i. Meters operate within the gravity range specified by the manufacturer;
- ii. Meters operate within the manufacturer's specifications for maximum and minimum flow rate for linear accuracy; and
- iii. Meters are reproven when changes in metering conditions affect the meters' performance such as changes in pressure, temperature, density (water content), viscosity, pressure, and flow rate.



Sec. 250.1202 Liquid Hydrocarbon Measurement (cont.)

4) Ensure that sampling devices conform to the following:

- i. The sampling point is in the flow stream immediately upstream or downstream of the meter or divert valve (in accordance with the API MPMS as incorporated by reference in 30 CFR 250.198);
- ii. The sample container is vapor-tight and includes a power mixing device to allow complete mixing of the sample before removal from the container; and
- iii. The sample probe is in the center half of the pipe diameter in a vertical run and is located at least three pipe diameters downstream of any pipe fitting within a region of turbulent flow. The sample probe can be located in a horizontal pipe if adequate stream conditioning such as power mixers or static mixers are installed upstream of the probe according to the manufacturer's instructions.



Sec. 250.1202 Liquid Hydrocarbon Measurement (cont.)

(I) What are the requirements for royalty and inventory tank facilities? You must:

- 1) Equip each royalty and inventory tank with a vapor-tight thief hatch, a vent-line valve, and a fill line designed to minimize free fall and splashing;
- 2) For royalty tanks, submit a complete set of calibration charts (tank tables) to the Regional Supervisor before using the tanks for royalty measurement;
- 3) For inventory tanks, retain the calibration charts for as long as the tanks are in use and submit them to the Regional Supervisor upon request; and
- 4) Obtain the volume and other measurement parameters by using correction factors and procedures in the API MPMS as incorporated by reference in 30 CFR 250.198.



Sec. 250.1205 Site Security

a) What are the requirements for site security? You must:

- 1) Protect Federal production against production loss or theft;
- 2) Post a sign at each royalty or inventory tank which is used in the royalty determination process. The sign must contain the name of the facility operator, the size of the tank, and the tank number;
- 3) Not bypass BSEE-approved liquid hydrocarbon royalty meters and tanks;
- 4) Report the following to the Regional Supervisor as soon as possible, but no later than the next business day after discovery:
 - i. Theft or mishandling of production;
 - ii. Tampering or bypassing any component of the royalty measurement facility; and
 - iii. Falsifying production measurements.



Sec. 250.1205 Site Security (cont.)

b) What are the requirements for using seals? You must:

- 1) Seal the following components of liquid hydrocarbon royalty meter installations to ensure that tampering cannot occur without destroying the seal:
 - i. Meter component connections from the base of the meter up to and including the register;
 - ii. Sampling systems including packing device, fittings, sight glass, and container lid;
 - iii. Temperature and gravity compensation device components;
 - iv. All valves on lines leaving a royalty or inventory storage tank, including load-out line valves, drain-line valves, and connection-line valves between royalty and non-royalty tanks; and
 - v. Any additional components required by the Regional Supervisor.



Sec. 250.1205 Site Security (cont.)

- 2) Seal all bypass valves of gas royalty and allocation meters.
- 3) Number and track the seals and keep the records at the field location for at least 2 years; and
- 4) Make the records of seals available for BSEE inspection.



Meter Seal Requirements

Note: If a bypass exists around a gas royalty meter and/or an oil/gas allocation meter, all valves must be sealed. Regardless of the size, capability or service of the line, a connection on the upstream side of the meter which can not be measured can be considered a bypass. Example: A line generally used as a liquid dump of a header is considered a bypass as it connects the upstream header to the down stream header and bypasses the meter.



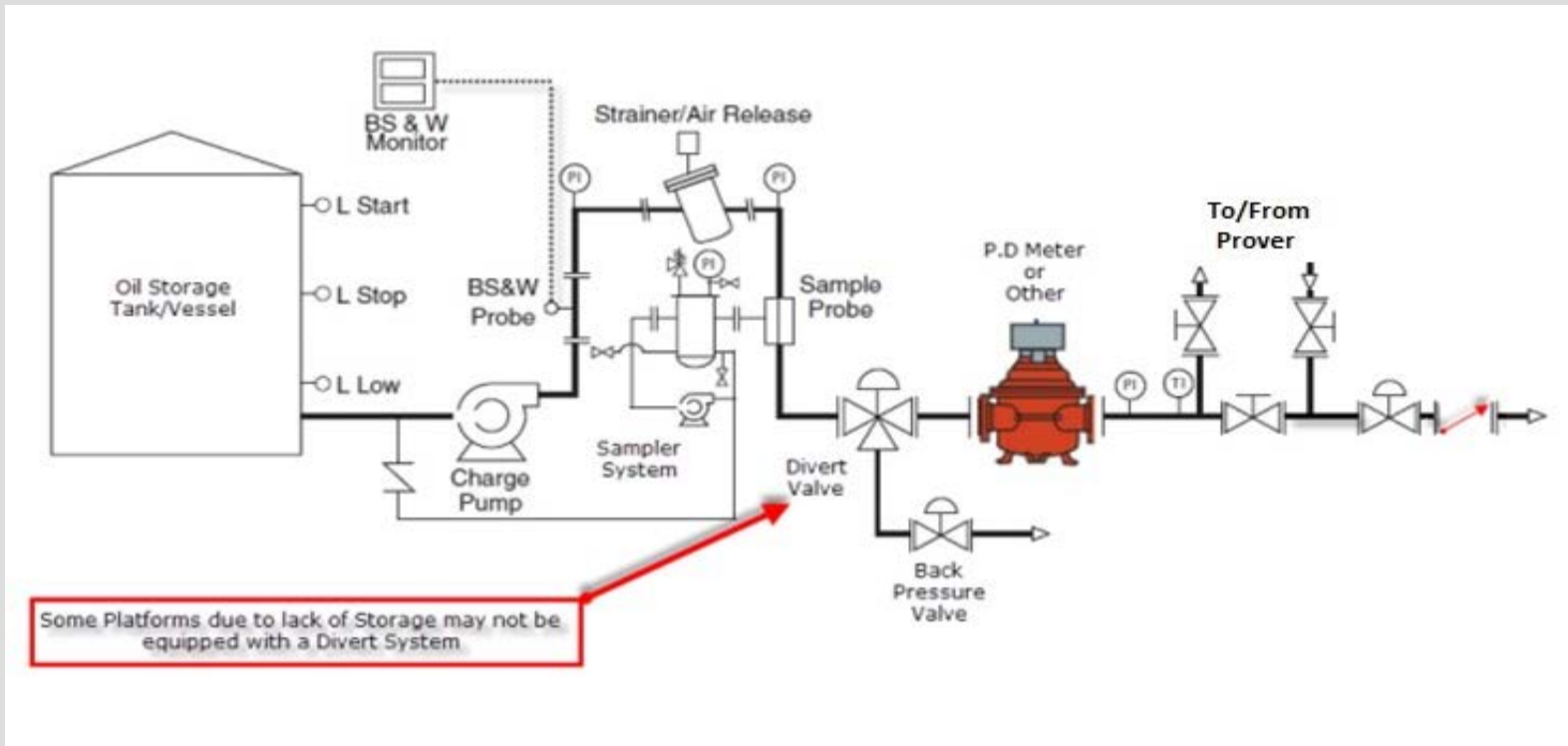
Example: Bypass Piping of Gas Measurement Skid



Example of bypass on Gas Sales Skid (Note: This picture is an example of a Gas Measurement Skid, designs may vary.)



Example: Lease Automatic Custody Transfer (LACT) Unit



Example of LACT Unit (Note: This picture is an example of a LACT Unit, designs may vary.)



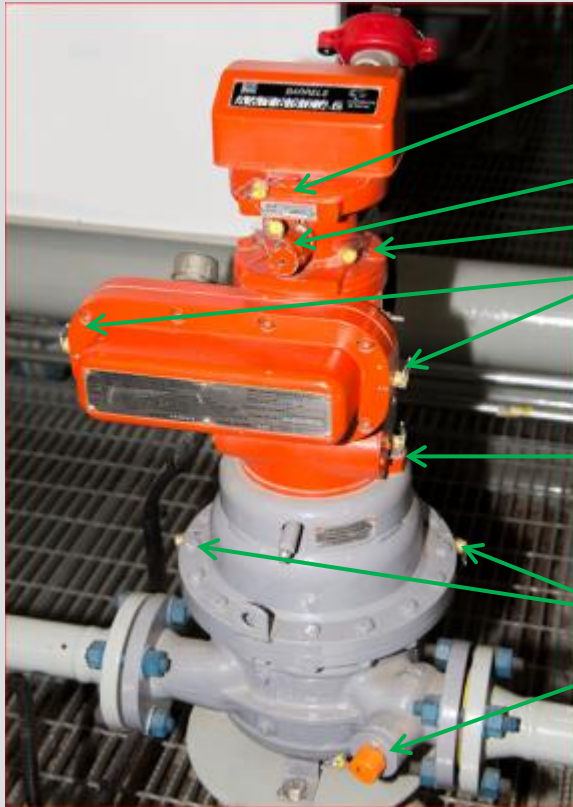
Quantity System Sealing

- PD Meters
- Turbine Meters
- Flow Computer / Data Averaging Device
- Sales / Inventory Tanks

Note: These are the main systems that require sealing per BSEE regulations. The Pipeline company may install additional sealing that exceed BSEE regulations.



Example: PD Meter Sealing



- 6. Totalizer / Counter
- 6. Totalizer / Counter J-box
- 7. Right angle drive cap
- 8. Right angle drive
- 9. Pulse transmitter cover
- 9. Pulse transmitter J-box if a termination point
- 9. Pulse transmitter
- 10. Dummy calibrator insp. plate
- 10. Dummy calibrator cover
- 11. Case vent
- 11. Case housing
- 12. Temperature port
- 13. Drain valve



Note: Refer to the Royalty Meter Seal Log – PD slide



Royalty Meter Seal Log - PD

Meter Sealing Guidance Form #1

Numbered seals shall be traceable and documented with record

1. Date: Enter date that any one seal had been broken and document new seal number (update report accordingly)
2. Lessee/Operating Company: Enter name of the Lessee or Operating Company at the time the seals were broken and reinstalled.
3. Facility Location: Enter facility location and platform designated number (Area and Block for offshore locations). Information may also be obtained from the current Surface Commingling and Production Approval Agreement.
4. Facility Measurement Point (FMP): Enter FMP number issued by BSEE for the specific location.
5. Meter Number, Make, Model Number and Serial Number: Meter make, Serial number and Model number are usually located on the meter tag from manufacturer. For meter number (Meter #1, Meter #A, Meter AA, Meter B, Meter #2, etc.) use designated number from the current Surface Commingling and Production Approval Agreement.



Royalty Meter Seal Log - PD

Meter Sealing Guidance Form #1

Numbered seals shall be traceable and documented with record

6. Meter Totalizer / Counter and Junction Box: Independent numbered seal shall be used on totalizer and J-box (if J-box is utilized for termination).
7. Right Angle Drive Cap: Independent numbered seal shall be used
8. Right Angle Drive: Independent numbered seal shall be used
9. Pulse Transmitter, Transmitter Cover, and Junction Box: Independent numbered seal shall be used on the transmitter, cover, and J-box.
10. Dummy Calibrator Inspection Plate and Housing Cover: Independent numbered seals shall be used on plate and cover.
11. Meter Case Housing and vent: Dual Independent numbered seal shall be used on the case housing and vent.
12. Meter Housing Temperature Port: Independent numbered seal shall be used.



Royalty Meter Seal Log - PD

Meter Sealing Guidance Form #1

Numbered seals shall be traceable and documented with record

13. Drain Valve: Independent numbered seal shall be used. All Valves, ball valve handle retainer nuts, tubing and/or pipe fittings shall be sealed using numbered seals when applicable. When not applicable, liquid seal or a plastic cover (Engineered or Man-Made) which prevents the ability to loosen or remove the fittings, can be utilized to eliminate tampering.
14. Flow Computer / Electronic Temperature Averager panel door or enclosure, Temperature and Pressure Transmitter termination covers, RTD's or Averaging Devices and Thermocouples, and gauge valves: An independent numbered seal shall be used on the Flow Computer / Electronic Temperature Averager. An independent numbered seal shall be used on the Temperature and Pressure Transmitter termination covers, and RTD's or Averaging Devices and Thermocouples when applicable. When not applicable, liquid seal or a plastic cover (Engineered or Man-Made) which prevents the ability to loosen or remove the fittings, can be utilized to eliminate tampering. (Examples of temperature averages: CATALAC, LINKO, etc.)
 1. Where applicable: Omni Flow Computer Rack



Royalty Meter Seal Log - PD

Meter Sealing Guidance Form #1

Numbered seals shall be traceable and documented with record

15. Remarks: Document all pertinent information (Example: date, seal number, reason) for the current seal log date.

NOTE: All Seals on the meter including all components associated, need to be documented and current. For sealing with numbered seals, if so, lessee or operating company may utilize one or more numbered seals per seal point. However, seal numbers that are in place need to reflect current seal report. The Royalty Meter Seal Log and Sample System Seal Log can be combined into one Seal Log Report.



Example: Turbine Meter Seal



6. Pickup / preamp enclosure

7. Pickup / preamp connection point to housing if applicable

8. Pickup / preamp union if applicable

12. Housing Flange offset 90 deg.

Note: Refer to the Royalty Meter Seal Log – Turbine slide



Royalty Meter Seal Log - Turbine

Meter Sealing Guidance Form #2

Numbered seals shall be traceable and documented with record

1. Date: Enter date that any one seal had been broken and document new seal number (update report accordingly)
2. Lessee/Operating Company: Enter name of the Lessee or Operating Company at the time the seals were broken and reinstalled.
3. Facility Location: Enter facility location and platform designated number (Area and Block for offshore locations). Information may also be obtained from the current Surface Commingling and Production Approval Agreement.
4. Facility Measurement Point (FMP): Enter FMP number issued by BSEE for the specific location.
5. Meter Number, Make, Model Number and Serial Number: Meter make, Serial number and Model number are usually located on the meter tag from manufacturer. For meter number (Meter #1, Meter #A, Meter AA, Meter B, Meter #2, etc.) use designated number from the current Surface Commingling and Production Approval Agreement.



Royalty Meter Seal Log - Turbine

Meter Sealing Guidance Form #2

Numbered seals shall be traceable and documented with record

6. Meter primary pickup / preamp enclosure: Independent numbered seal shall be used.
7. Meter primary pickup / preamp connection to meter housing: Independent numbered seal shall be used.
8. Meter primary pickup / preamp connection union where applicable: Independent numbered seal shall be used.
9. Meter secondary pickup / preamp enclosure where applicable: Independent numbered seal shall be used.
10. Meter secondary pickup / preamp connection to meter housing where applicable: Independent numbered seal shall be used.



Royalty Meter Seal Log - Turbine

Meter Sealing Guidance Form #2

Numbered seals shall be traceable and documented with record

11. Meter secondary pickup / preamp connection union where applicable:
Independent numbered seal shall be used.
12. Meter housing flanges: Independent numbered seal shall be used per flange
offset by 90 degrees.
13. Flow Computer panel door or enclosure, Temperature and Pressure
Transmitter termination covers, RTD's, and gauge valves: An independent
numbered seal shall be used on the Flow Computer. An independent
numbered seal shall be used on the Temperature and Pressure Transmitter
termination covers, and RTD's when applicable. When not applicable, liquid
seal or a plastic cover (Engineered or Man-Made) which prevents the ability to
loosen or remove the fittings, can be utilized to eliminate tampering.
 1. Where applicable: Omni Flow Computer Rack



Royalty Meter Seal Log - Turbine

Meter Sealing Guidance Form #2

Numbered seals shall be traceable and documented with record

14. Remarks: Document all pertinent information (Example: date, seal number, reason) for the current seal log date.

NOTE: All Seals on the meter including all components associated, need to be documented and current. For sealing with numbered seals, if so, lessee or operating company may utilize one or more numbered seals per seal point. However, seal numbers that are in place need to reflect current seal report. The Royalty Meter Seal Log and Sample System Seal Log can be combined into one Seal Log Report.

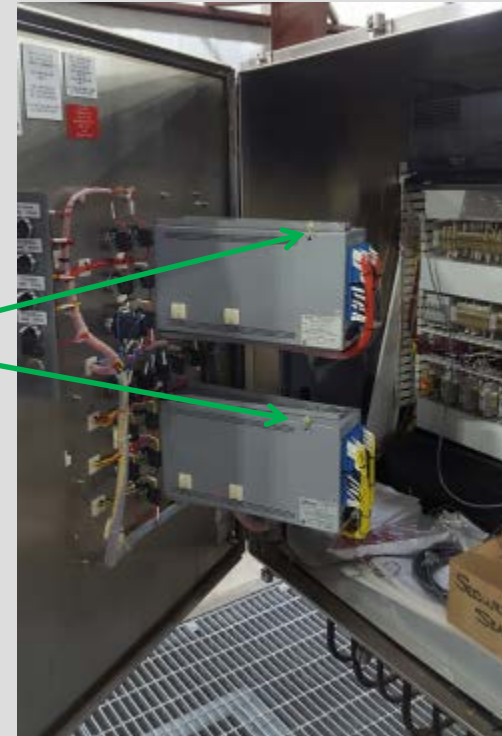


Example: Flow Computer / Data Averaging Device Sealing



PD Meter 14.
Turbine Meter 13.
Panel Door Seal

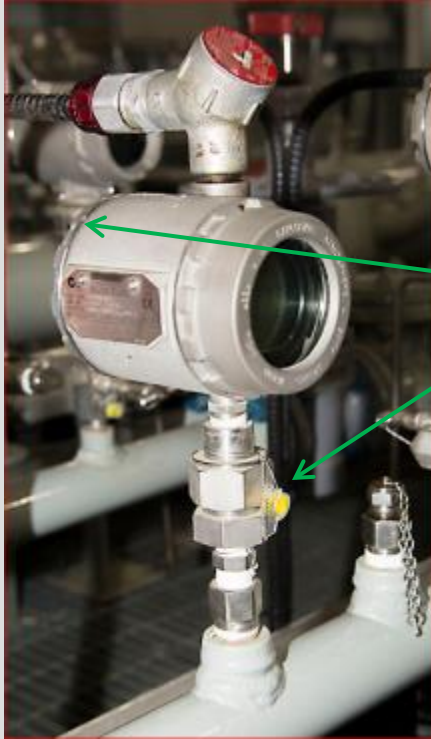
PD Meter 14.1
Turbine Meter 13. 1
Omni Rack Seal



Note: Refer to the Royalty Meter Seal Log – PD and Turbine slides



Example: Temperature and Pressure Transmitter Sealing



PD Meter 14.
Turbine Meter 13.
Transmitter
termination cover,
Temperature RTD
union, and Pressure
gauge valves



Note: Refer to the Royalty Meter Seal Log – PD and Turbine slides

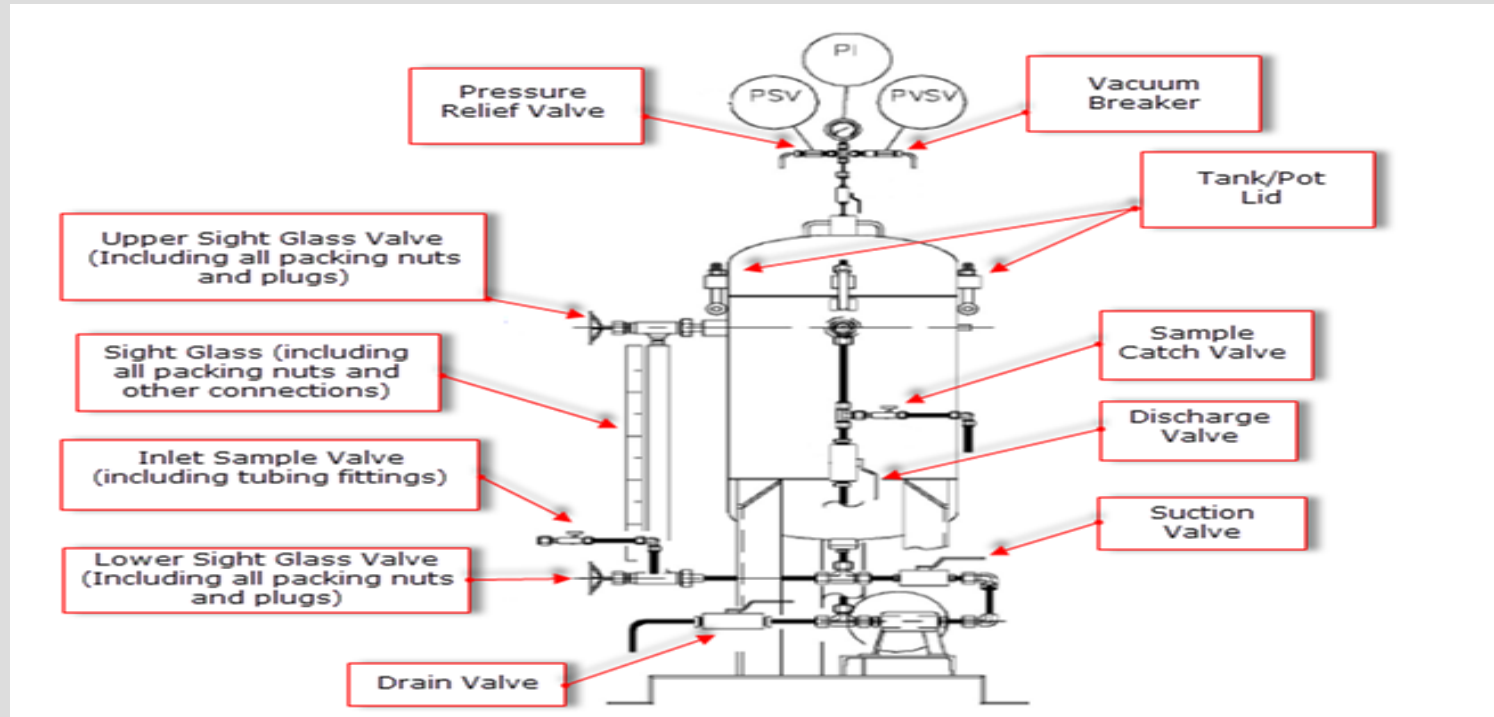


Example: Inventory Tank Sealing





Example: Quality System Sealing



****All Tubing and/or Pipe fittings shall be sealed using wire seals when applicable. When not applicable, liquid torque seal (Example: tubing, piping, electrical conduit) or a plastic cover which prevents the ability to loosen or remove the fittings can be utilized to eliminate tampering**



SAMPLE SYSTEM SEAL LOG REPORT

Sample System Sealing Guidance Form #1

Numbered seals shall be traceable and documented with record

1. Date: Enter date that any one seal had been broken and document new seal number (update report accordingly)
2. Lessee/Operating Company: Enter name of the Lessee or Operating Company at the time the seals were broken and reinstalled.
3. Facility Location: Enter facility location and platform designated number (Area and Block for offshore locations). Information may also be obtained from the current Surface Commingling and Production Approval Agreement.
4. Facility Measurement Point (FMP): Enter FMP number issued by BSEE for the specific location.
5. Sample Container Number: The number of the sample container. In some cases lessee utilizes the use of two sample container systems due to the design of the current equipment. Some sample containers are totally independent to one meter. (Ex. Sample container #1 is only used with LACT meter #1.) If this is the case lessee or operating company may utilize the use of two sample seal reports.
6. Container Lid: Two independent numbered seals shall be used, which would require the seals to be broken if opened. One seal may be used when lid hinge bolts are secured via tack weld.



SAMPLE SYSTEM SEAL LOG REPORT

Sample System Sealing Guidance Form #1

Numbered seals shall be traceable and documented with record

7. Pump Suction and Discharge, Sample Catch, and Drain Valves: An independent numbered seal shall be used for each valve sealed in the close position. See Note 1 for additional information.
8. Tubing and/or Pipe Fittings : An independent numbered seal shall be used. Only the unions are required to be sealed in a close loop Tubing and/or Pipe configuration (Example; Sample container circulation piping). See Note 1 for additional information.
9. Container Gauge, Pressure Relief, and Vacuum Relief: A numbered seal shall be used. See Note 1 for additional information.
10. Sampler Isolation Valve: An independent numbered seal shall be used for each valve sealed in the open position. See Note 1 for additional information.
11. Sampling Mechanism/Controller: An independent numbered seal shall be used if applicable on the; Sample Volume Adjustment, Sample Probe and sampler controller/motor housing. (See Item #8 in this document for further details.)
12. Sight Glass and Sight Glass Valve Packing Nuts: Lessee shall use a numbered seal.
13. Remarks: Document all pertinent information (Example: date, seal number, reason) for the current seal log date.



SAMPLE SYSTEM SEAL LOG REPORT

Sample System Sealing Guidance Form #1

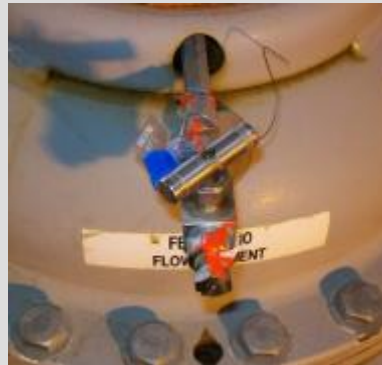
Numbered seals shall be traceable and documented with record

NOTES:

1. Ball valve handle retainer nuts, tubing and/or pipe fittings, gauges, and reliefs shall be sealed using numbered seals when applicable. When not applicable, liquid seal or a plastic cover (Engineered or Man-Made) which prevents the ability to loosen or remove the fittings, can be utilized to eliminate tampering.
2. All Seals on the sampling system including the mixing system need to be documented and current. For sealing with numbered seals, if so, lessee or operating company may utilize one or more numbered seals per seal point. However, seal numbers that are in place need to reflect current seal report. The Royalty Meter Seal Log and Sample System Seal Log can be combined into one Seal Log Report.



Examples of Some Acceptable Sealing Methods



Note: Various sealing methods may be used as long as they are tamper proof.



THE END