

BAYOU ETHANE MEASUREMENT AND TESTING PROCEDURES

The following Ethane Measurement procedures outline are the general measurement practices that must be adhered to unless superseded by different parameters agreed upon in the site-specific connection agreement.

A. General

1. Unit of Measurement: The unit of measurement of the Ethane product stream shall be one (1) Pound mass.
2. Receipt Pressure: The Receipt Point measurement station shall be capable of measuring the volume of Ethane delivered hereunder at pressures up to 1425 psig (ANSI 600 class).
3. Flow Meter Calibration: All calibrations, adjustments, and calculations shall be adjusted to Standard Conditions. Standard Conditions shall mean 60 degrees Fahrenheit and the equilibrium vapor pressure of the Ethane being measured. All flow measurement will be made utilizing temperature and pressure at flowing line conditions. Calibrations shall be in accordance with manufacturer's recommendations and the requirements of API Chapter 14.3 Parts 1-4 and API Chapter 21.1 Electronic Gas Measurement, latest revisions.
4. Access to Equipment: Customer, or its representative, shall have access at all reasonable times to the equipment of BEP's measurement station equipment, or that of BEP's designees, but the reading, calibrating and adjusting thereof shall be done by the employees, agents, representatives or designees of BEP. Similarly, BEP shall have access at all reasonable times to the equipment of the Customer check measurement stations, but the reading, calibrating, and adjusting thereof shall be done by the employees, agents or representatives of the Customer.
5. Meter Ticket: A meter ticket will be generated for the Receipt Point above each day. A day is defined as a twenty-four hour period beginning at midnight. The billing period is from midnight on the first day of each month to midnight on the last day of the same month.
6. Review of Measurement Data: Customer's and BEP's personnel shall exchange measurement data on a timely basis in order to detect measurement discrepancies as they arise. In the event that Customer's and BEP's measurements differ more than two percent (2%) for two (2) or more days in succession, both metering facilities will be examined and calibrated to determine whether or not either or both metering facilities are conforming to good measurement practice and/or operation.
7. Flow Meter Proving Frequency: On a scheduled day of each month, or at other mutually agreeable intervals, BEP or BEP's designee shall test and verify the accuracy of its measurement equipment in accordance with the appropriate referenced standards. BEP or its designee shall give Customer notice of the date and time of each test sufficiently in advance (72 hours minimum) to permit Customer to have a representative present to witness such test result Calibration records of either Customer's or BEP's measurement equipment shall be available for review by either party.

8. Certification of Test Equipment: Certification and calibration records of either Party's applicable test equipment shall be maintained and made available for review by the other Party.
9. Special Tests: Either Party to this Agreement may also request a special test of any measurement equipment at its cost and expense. In such event, the Parties shall cooperate to secure prompt verification of accuracy of the equipment.

B. Mass Measurement Calculations- Orifice

1. Ethane Product: The quantity of Ethane shall be measured by orifice meter and a densitometer and shall be calculated by mass measurement procedures in accordance with A.P.I Chapter 14.3, and API Chapters 14.4, 14.6 and 14.7 and/or procedures agreed to by both parties.
2. Flow Calculation: The mass flow equation used for the measurement calculation (from API Chapter 14.3) is as follows:

$$q_m N_l C_d (E_v) (Y) (d^2) \text{ sq. rt. } [(p_t, p)(\Delta P)] \text{ Equation (1-2)}$$

Where:

q_m = mass flow rate.

N_l = unit conversion factor.

C_d = orifice plate coefficient of discharge.

d = orifice plate bore diameter calculated at flowing temperature (T_f).

ΔP = orifice differential pressure.

E_v = velocity of approach factor.

$\rho_{t,p}$ = Density of the fluid at flowing conditions, P_f , and T_f . (The flowing density as measured by densitometer).

Y = Expansion Factor.

3. Density: The flowing density of the stream shall be determined by the continuous use of a vibrating tube type densitometer of standard make installed in accordance with API Chapter 14.6 and the manufacturer's recommendations and operated so that the instrument will properly measure the density of the fluid at flowing pressure and temperature.
4. Time Basis: Mass measurement shall be calculated on a daily basis by determining the necessary readings at the designated time on one day and those same readings at the designated time on the previous day.

5. Convert Mass to Gallons: If required by either BEP or Customer, the determined mass shall be converted to gallons at Standard Conditions in accordance with API Chapters 14.4 and 14.7, using weight-in-vacuum factors from GPA Standard 2145, all latest editions.

C. Mass Measurement Calculations- Coriolis

1. Ethane Product: The quantity of Ethane shall be measured by Coriolis meter and be calculated by mass measurement procedures in accordance with API Chapter 5.6 and/or procedures agreed to by both parties. The mass measurement will be converted to volume (barrels, gallons) by use of bi-monthly sampling data.
2. Time Basis: Mass measurement shall be calculated on a daily basis by determining the necessary readings at the designated time on one day and those same readings at the designated time on the previous day.

D. Measurement Equipment Calibration - Orifice

1. Orifice Meter Calibrations: All the orifice meter instrumentation (DP, PT and TT) shall be calibrated and the orifice plate inspected at the beginning of the delivery and a minimum of every thirty (30) days during the delivery. Necessary repairs to the metering equipment and replacement of the orifice plate shall be made when the equipment does not meet the required standards provided in the appropriate MPMS manual, latest edition.
2. Errors less than 0.25%: If the densitometer factor or orifice meter calibration deviates less than $\pm 0.25\%$ from one scheduled proving to the next, the effective date of the new factor shall be the date of the proving and shall remain in effect until the next proving.
3. Errors more than 0.25% and less than 0.50%: If the densitometer factor or orifice meter calibration deviates more than $\pm 0.25\%$, but less than $\pm 0.50\%$, then the effective date of the new densitometer factor shall be the date on which an event occurred which is known to have changed the factor, or if such date is not known, then the effective date is determined as defined in "Volume Corrections", Section F below. If the densitometer factor deviation falls between $\pm 0.25\%$ and $\pm 0.50\%$, then it shall be the decision of the concerned field parties as to the scope and corrective action taken, if any.
4. Errors more than 0.50%: Any deviation greater than $\pm 0.50\%$ is not acceptable, and immediate steps shall be taken to effect the required maintenance or repairs.

E. Measurement Equipment Calibration - Coriolis

1. Onsite Verification Meter: If installed, as a part of the BEP measurement system, a separate meter with the same design and specifications may be used to verify the volumes measured by the primary custody meter as outlined in the "Onsite Meter Verification" section below, if agreeable by both the delivery and receiving party.
2. Check Meter: If a check meter is desired by the other party, it shall be installed in a manner so it does not interfere or affect the BEP measurement system.

3. Mass Flow and Density Meter (Coriolis) Calibration: BEP will prove the meter(s) utilizing a mass prover equipped with densitometer at the measurement facility and shall provide proper notice to the appropriate and applicable custody customer personnel at least seventy-two (72) hours' notice of the intent and time to prove so representatives of the Customer and BEP can be present to witness the meter proving and calibration.

BEP and Customer (or Customer's custody representative) will communicate and cooperate to coordinate schedules by providing notice with as much notice as possible in advance of the 72 hours required in above of the targeted date for the annual meter proving and calibration and will update or reschedule (as soon as reasonably possible) should any conflict with the date and time arise.

The meter correction factor shall be established at flowing line conditions in accordance with API MPMS Chapter 12.2, and GPA 8182. The meter proving data shall be delivered to the other party on a Meter Proving Report.

The average results from minimum of five consecutive calibration tests will be used to calculate the meter correction factor for the meter and must repeat within 0.05 percent or meet repeatability per Table A.1 of *Repeatability Criteria for 0.027 % Uncertainty of API MPMS Chapter 4.8*). The average meter correction factor will be no more than 0.0025 from the previous meter proving factor under similar operating conditions.

At the time of calibration, if the meter cannot be calibrated within these limits, BEP shall proceed with diligence to effect maintenance or repair and recalibration of the meter. Upon recalibration, if the new meter factor meets the above requirement, then the new meter factor may be used for a correction, if necessary, in a manner mutually agreeable to both parties.

Proving intervals – After a history of proving factors are established monthly for six consecutive months, to establish a meter factor baseline, the Coriolis meter is proved no less than quarterly and as agreed in the Connection Agreement.

4. Onsite Meter Verification: As an alternative to a regularly scheduled meter proving for calibrating check or verification meters, the product flow will be directed in series through both the primary and verification meter to compare and verify the mass pound volumes are within acceptable differences.

The verification test will be conducted for one-hour:

- If the mass pound volume differences are $\pm 0.25\%$ or less, the primary meter is considered acceptable.
- If the mass pound volume differences exceed $\pm 0.25\%$, the test is considered questionable and a meter prove will be scheduled to calibrate both meters as soon as practical.
- A verification test will be conducted monthly or more often if deemed necessary or as agreed in the Connection Agreement.

The onsite meter verification process is met to regularly verify the primary custody meter is operating consistently. The primary and verification meter will be calibrated with a certified meter prover on six-month intervals.

F. Densitometer Proving

1. Proving Frequency: The accuracy of the densitometer shall be verified monthly by calibrating and proving the instrument in accordance with MPMS Chapter 14.6 and the manufacturer's recommendations.
2. Densitometer Correction Factor: Two (2) provings shall be performed to establish the densitometer correction factor. The average of the two (2) provings shall be taken as the densitometer correction factor if the two (2) provings have a repeatability tolerance not greater than 0.05 percent.
3. Deviation Requirements: See "Meter and Densitometer Factor or Orifice Calibration Deviation" Section D below.

G. Sampling and Analysis

1. Samples Required and Frequency:
 - a. Receipt Point: A composite sample of the Ethane product shall be taken at the Receipt Point Monthly or more frequently, if required, and used with the mass calculation to determine a "Ethane delivery in volume" (if applicable). The subject volume calculation shall be based upon a temperature of sixty degrees Fahrenheit (60°F) and the equilibrium vapor pressure of the Ethane product and be a flow proportional sample.
2. Composite Sampler: An automatic continuous flow proportional sampler shall be installed and used at the Receipt Point or at other mutually agreeable point in accordance with the following requirements:

- a. Operator: The receiving party or its designee shall operate the sampling equipment.
 - b. Sample Basis: The sampling equipment shall be designed to accumulate a representative sample proportional to the flow of the Ethane product passing through the measurement station.
 - c. Mixing Device: The sampling equipment shall be equipped with mixing facilities to eliminate any stratification.
 - d. Sampling Method: All sampling shall be in accordance with GPA Standard 2174, latest edition.
3. Analysis Requirements:
- a. Ethane Product Analysis shall be in accordance to "Tentative Method for Analysis of Demethanized Hydrocarbon Liquid Mixtures Containing Nitrogen and Carbon Dioxide by Gas Chromatograph", GPA Standard 2177, latest edition.
4. Check Sample and Referee: Upon request, the receiving party shall retain the remaining sample for a period of at least fifteen (15) Days. If the receiving party and delivery party are unable to mutually agree on the analysis, the retained sample shall be sent to a mutually agreeable independent laboratory for analysis. If the reproducibility for any component determined by the receiving party exceeds the limits specified in the applicable GPA Standard. If the independent lab analysis agrees more closely with the delivery party analysis, then the independent lab analysis shall be used rather than the receiving party's analysis, and the receiving party shall bear the cost of the analysis conducted by the independent laboratory. If the analysis determined by the receiving party is within acceptable limits of the GPA Standard reproducibility criteria compared to the independent analysis, then the original analysis shall be used exclusively and the delivery party shall bear the cost of the independent laboratory's analysis.
5. Unavailable Sample: In the event that a sample is not available for a particular Month, the parties shall determine an analysis based on the most recent mutually accepted data. The utilization of a spot sample may be acceptable if both parties are agreeable.

H. Volume Corrections

If, upon calibration tests, the meter does not meet requirements given, then any previous recording of such equipment shall be corrected for any period which is known or agreed upon, but in case the period is not known or agreed upon, such correction shall apply to one-half (1/2) the total volume measured since the date of the last calibration (proving). However, this correction shall not exceed sixteen (16) days.

I. Correction of Errors

Measuring equipment found to be registering inaccurately should be adjusted to read accurately. Measuring equipment found to be out of service shall be adjusted to read accurately and placed in service. For any error not known or agreed upon for the period in which the meter was inaccurate or out of service, the volume of the stream shall be estimated by use of any of the following or other methods which shall be mutually agreed upon by the parties:

- In the event that only one of the metering facilities is found to have had a significant defect in performance, the other measuring facility will be the agreed upon billing basis for that billing period.
- If it is determined that both of the measuring installations experienced significant defects in performance, billing for the period in question shall be based upon such data as the receiving party and the delivery party shall, in good faith, find mutually acceptable.

J. Technical Publications

1. Revisions to such API, and GPA publications shall apply to computations and operation of measurement stations but shall not be construed to require major modifications to, or replacement of, said equipment.
2. Following is the current list of publications referenced in this Exhibit (latest editions).
 - a. API Manual of Petroleum Measurement Standards (MPMS), American Petroleum Institute, Washington D.C.:
 1. Chapter 1, *Vocabulary*,
 2. Chapter 4, *Proving Systems*, Section 2, *Conventional Pipe Provers*
 3. Chapter 4, *Proving Systems*, Section 3, *Small Volume Provers*
 4. Chapter 4, *Proving Systems*, Section 8, *Operation of Proving Systems*
 5. Chapter 4, *Proving Systems*, Section 9, *Methods of Calibration for Displacement and Volumetric Tank Provers*
 6. Chapter 5, *Metering*, Section 4, *Accessory Equipment for Liquid Meters*,
 7. Chapter 5, *Metering*, Section 6, *Measurement of Liquids Hydrocarbons by Coriolis Meters*
 8. Chapter 9, Section 4, *Continuous Density Measurement Under Dynamic (Flowing) Conditions*
 9. Chapter 14, *Natural Gas Fluids Measurement*, Section 4, *Converting*

Mass of Natural Gas Liquids and Vapors to Equivalent Liquid Volumes,

10. Chapter 14, *Natural Gas Fluids Measurement*, Section 6, *Continuous Density Measurement*,
11. Chapter 14, *Natural Gas Fluids Measurement*, Section 7, *Mass Measurement of Natural Gas Liquids*,
12. Chapter 14, *Natural Gas Fluids Measurement*, Section 8, *Liquefied Petroleum Gas Measurement*,
13. Chapter 14, *Natural Gas Fluids Measurement*, Section 3, *Concentric Square-Edged Orifice Meters*, Parts 1, 2, 3 and 4

OR

b. Standards of the Gas Processors Association (GPA), Tulsa, Oklahoma (latest editions):

- (1) GPA Standard 8182 - Tentative Standard for the Mass Measurement of Natural Gas Liquids
- (2) GPA Standard 8173 - Method for Converting Mass Natural Gas Liquids and Vapors to English Liquid Volumes
- (3) GPA Standard 2145 - Physical Constants for Paraffin Hydrocarbons and Other Components of Natural Gas
- (4) GPA Standard 2174 - Obtaining Liquid Hydrocarbon Samples for Analysis by Gas Chromatography
- (5) GPA Standard 2186 - Tentative Method for the Extended Analysis of Hydrocarbon Liquid Mixtures Containing Nitrogen and Carbon Dioxide by Temperature Programmed Gas Chromatography
- (6) GPA Standard 2177 - Analysis of Demethanized Hydrocarbon Liquid Mixtures Containing Nitrogen and Carbon Dioxide by Gas Chromatography