	MEASUREMENT POLICIES	
	METER CALIBRATION AND PROVING	MP – 5
Approved by:	Measurement Steering Committee	
Date of Approval:	Oct 31, 2010	
Page:	Page 1 of 5	

POLICY OBJECTIVE & SCOPE

The accuracy of a measurement device may deviate over time due to wear, changes in operating conditions, changes in ambient conditions, etc. Generally, the more important the accuracy of a measurement device, the more frequently it must be calibrated or proved.

There are three key components to a meter device that impact the meter's ability to capture accurate measurement readings. These three components are:

1. The installation and operating condition of the end recording device (chart or EFM)
2. The internal components of the gas meter (orifice plates, vortex shredder bars, and turbine rotors)
3. The meter element sensing lines

The meter element sensing line installation and plumbing if incorrect or damaged can often cause significant capillary action of liquids and liquid traps resulting in inaccurate measurement. The goal is to reduce the likelihood of liquids forming and being trapped in the sensing lines by ensuring sufficient downward slope in the lines, sufficient diameter of the sensing lines, and minimizing the length of sensing lines.


The accuracy of a meter is also dependent on the procedures and effectiveness of the calibration (gas) or proving (liquids) procedures followed. Thus, the selection of a qualified meter calibration/proving contractor is the first step to ensure that AltaGas accuracy requirements are met.

REFERENCES


1. ERCB Directive 017 Measurement Requirements for Upstream Oil and Gas Operations
2. ERCB Directive 046 Production Audit Handbook
3. API Chapter 21.2 Automation Requirements
4. Calibration Company Expectations Policy (MP-7)
5. Calibration and Proving Witnessing Checklists (MP-8)

REQUIREMENTS

1. A meter which the volume or resulting energy is used in the production accounting allocations or regulatory reporting requires calibration/proving by a qualified and pre-approved Meter Calibration Service Provider.
2. All new meters shall be calibrated on a monthly basis until such time as an historical trend is determined. If the historical data shows an acceptable trend, calibration of the meters may be reduced. An acceptable historical trend is one where the calibration does not vary by more than +/-2.0% between calibrations for gas and +/-5.0% for liquids. Evidence of this trend must be signed off by the operator and available for audit over the first 24 months of the meter.
3. A meter tag or label must be attached to the meter end device that identifies the meter serial number and the date of calibration.

	MEASUREMENT POLICIES	
	METER CALIBRATION AND PROVING	MP – 5
Approved by:	Measurement Steering Committee	
Date of Approval:	Oct 31, 2010	
Page:	Page 2 of 5	

4. Measurement recording devices (chart recorders or EFM) must be calibrated with a calibration instrument that has been tested for accuracy against National Standards.
 - The calibration of measurement recording device requires the various meter elements to be subjected to various actual pressures, temperature, and other values that are concurrently subjected to the calibration equipment. If the end device does not indicate the same value as the calibration equipment within reasonable tolerances, adjustments must be made to the meter element and/or end device.
5. The meter internal components (example: orifice plate) must be removed from service, inspected, replaced or repaired if found to be damaged, and then placed back in service, in accordance with procedures specified by the American Petroleum Institute (API), the American Gas Association (AGA), or other relevant standards organizations, other applicable industry-accepted procedures, or the device manufacturer's recommended procedures, whichever are most applicable and appropriate.
 - Whenever possible, the inspection should be done at the same time as the calibration of the meter elements and end device, but to accommodate operational constraints the inspection may be conducted at any time, provided that the frequency requirement is met.
6. The meter element sensing lines must be inspected for compliance to the following conditions:
 - Meter element sensing lines must be continuously sloped downward from the measurement recording device to the meter run to reduce the likelihood of liquids becoming trapped and impacting the measurement accuracy.
 - Meter element sensing lines must have a minimum 0.5 inch diameter to reduce the likelihood of capillary action and liquids being drawn to the measurement recording device.
 - The length of the meter element sensing lines should be kept to a minimum.
 - Meter element sensing lines must be checked for leaks at all connections.
 - Only one measurement recording device can be connected to a set of sensing thermal weld taps.
7. The calibration procedure should include the verification of the meter configuration parameters used in the volume calculation including the orifice plate size, atmospheric pressure, line size, calibration ranges (pressure & temperature), etc. Changes to the meter configuration parameters must be captured and input into the electronic device or communicated to the chart integrator in a timely basis.
8. The calibration/proving report is to be reviewed by the Field Operator to identify deficiencies and a plan for corrective actions to be developed (see MP-6 Calibration Report Review policy).
9. The date of each meter calibration procedure must be registered in **zediAccess.com** on the date the procedure is complete, for the purposes of monitoring compliance with the frequency requirements. The Calibration Date is registered under the "Location Properties" for each meter in zediaccess.com.
- 10.** The AltaGas Field Operator must communicate, in a timely fashion, all **changes to orifice plate size** to the appropriate system where the flow volume is calculated:
 - **EFM devices** – all changes to orifice plate size must be registered in zediaccess.com **within 5 minutes** of the change occurring.
 - If the EFM device can be programmed at the time of the orifice plate change the Field operator needs to confirm the change has been read by **zediaccess.com**
 - Alternately, if the EFM device cannot be programmed on demand by the Field Operator the orifice size must be updated in **zediAccess.com** within **5 minutes of the change** occurring. The EFM device needs to be configured with zediaccess.com to instantaneously accept the change.
 - **Chart Recorders** - all Changes to orifice plate size are to be written on the chart and communicated to the chart integrator. The Operator should confirm the orifice plate size by reviewing the flow parameters report on zediaccess.com once the chart has been integrated.

	MEASUREMENT POLICIES	
	METER CALIBRATION AND PROVING	MP – 5
Approved by:	Measurement Steering Committee	
Date of Approval:	Oct 31, 2010	
Page:	Page 3 of 5	

Liquid Meter Proving

All liquid meters must be calibrated in place with the following exceptions:

- Water meters may be bench calibrated
- Condensate meters may be bench calibrated if under 2 m³ per day

The meter factor(s) must be applied in the field where the volume is calculated. Production Accountants are not expected to apply any meter factors.

Calibration Equipment

Gas and liquid calibration equipment is required to be certified and re-certified on a regular basis. Certification of test equipment is addressed in this section.

Gas Meter Calibration Equipment

The requirements for gas meter calibration equipment are identified below:

1. The minimum uncertainty requirement for calibration equipment shall be a factor of two times better than the specified uncertainty of the transducer, transmitter or associated device being calibrated. All calibration equipment shall be certified against a reference standard traceable to the primary standards kept by the National Research Council of Canada, and re-certified every year thereafter. A copy of the certification should be filed in each field office.

Liquid Meter Calibration Equipment

The requirements for liquid meter calibration equipment are identified below:


1. The proving company's equipment shall be calibrated at least every two (2) years by Weights and Measures Canada or any other approved calibration company. Certification documentation, showing the uncertainty of the proving equipment, shall be readily available and produced by the proving company upon request and should be filed in each field office.
2. The proving vessels shall be steam cleaned on a regular basis.
3. The temperature indicators on the prover shall be calibrated every six (6) months.
4. The proving company shall regularly perform pressure testing on the hoses, fittings and associated equipment used in performing the calibrations.
5. Proof of points 2-4 above must be readily available (i.e.: in the truck).

Calibration Reports

All calibration reports shall be reviewed, validated and initialed by the Operator prior to filing. See MP-6 Measurement Policy Calibration Report Review for detailed procedures.

Where the calibration report indicates a difference greater than +/- 2% of the previous meter factor or calibration point, the Operator will initiate the appropriate action to resolve the route cause.

The detailed calibration report indicating tests conducted must be left with the meter and readily available for inspection.

	MEASUREMENT POLICIES	
	METER CALIBRATION AND PROVING	MP – 5
Approved by:	Measurement Steering Committee	
Date of Approval:	Oct 31, 2010	
Page:	Page 4 of 5	

FREQUENCY

Meter Calibration Frequency

The minimum calibration frequencies for gas and liquid meters is shown below:

Service	Meter Type	Facility	Frequency
Gas	Orifice meter	Gas plant & Gathering System	Semi-annually (twice per year)
Gas	Orifice meter	Battery, satellite, well	Annually
Gas	PD, turbine, ultrasonic	All facilities	Every 7 years
Oil	Turbine, PD, mass flow	Battery, satellite, well	Annually
Condensate	Turbine, PD, vortex	Well, compressor site, plant inlet	Semi-annually
Condensate, oil	Turbine, PD, Mass flow	Truck-off	Monthly
Water	Turbine, PD	All facilities	Annually
Gas, oil, condensate	All types	Custody transfer, delivery point	Monthly

New/serviced/re-installed Meter:

When a meter is installed, serviced, or re-installed it must be calibrated or proved immediately or within 30 days.

- All new meters shall be calibrated on a monthly basis until such time as an historical trend is determined. If the historical data shows an acceptable trend, calibration of the meters may be reduced. An acceptable historical trend is one where the calibration does not vary by more than +/-2.0% between calibrations for gas and +/-5.0% for liquids. Evidence of this trend must be signed off by the operator and available for audit over the first 24 months of the meter.


Internal Components:

The internal components of all gas meters; orifice, vortex and turbine must be removed from service and inspected on a yearly basis. The components of the orifice meter must be inspected during the annual calibration. Where this is not possible a work order must be generated to ensure the meter is inspected during the next shutdown.

Location of Liquid Meter Proving:

All liquid meters must be proved in place with the following exceptions:

- Water meters may be bench calibrated
- Condensate meters may be bench calibrated if under 2 m³ per day

	MEASUREMENT POLICIES	
	METER CALIBRATION AND PROVING	MP – 5
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Date of Approval:	Oct 31, 2010	
Page:	Page 5 of 5	

ROLES & RESPONSIBILITIES	
<p>Operators – To ensure the requirements of this policy are consistently met.</p> <ul style="list-style-type: none"> • Review and initial completed calibration reports. • Generate work orders for any deficiencies identified. • Record and/or confirm changes to meter configuration data, including orifice plate size. • Record the Calibration Date in zediaccess.com for AltaGas operated meters. 	
<p>Operations Supervisors - To schedule meter calibrations and proving in accordance with the Requirements and Frequency outlined within this policy. To ensure deficiencies are addressed through the close-out of work orders. Provide appropriate training on the use of zediaccess.com.</p>	
<p>Manager Operations - To ensure compliance to this policy is supported and to provide appropriate training.</p>	
<p>Calibration Service provider – see AltaGas Measurement Policy MP-7 Calibration Company Expectations.</p>	
<p>Measurement Program Steering Committee - To direct and approve measurement policies including this Meter Calibrations and Proving Policy.</p>	