	<b>MEASUREMENT POLICIES</b>	
	<b>LIQUID MEASUREMENT</b>	<b>MP - 2</b>
Approved by:	Measurement Steering Committee	
Date of Approval:	Oct 31, 2010	
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## POLICY OBJECTIVE & SCOPE

This Policy defines the requirements for the design and installation of existing and new **liquid measurement** systems at upstream facilities. Specifically, the measurement equipment used and volume computations performed where the volume or resulting energy is used in the production accounting allocations or regulatory reporting.

## REFERENCES

1. ERCB Directive 017 Measurement Requirements for Upstream Oil and Gas Operations
2. ERCB Directive 046 Production Audit Handbook


## REQUIREMENTS

All liquid meters operated by AltaGas must meet the following standards:

### **Equipment**

The design and installation of liquid measurement systems must be in accordance with the following:

1. Liquid meter shall be installed in accordance with ERCB, OGC, SIR and/or API requirements.
2. AltaGas will install liquid meters that are deemed most appropriate for each installation. AltaGas' preferred liquids meter technologies include:
  - Positive displacement meters
  - Ultrasonic meters
  - Mass flow meters
  - Vortex meters
  - Turbine meters
3. All liquid meters will have the properly located and sized proving connections in accordance with the manufactures specifications. Proving taps should be the same size as the line size.
4. All liquid meters used in the production accounting, allocations, or regulatory reporting will be equipped with an electronic pulse pick-up device.
5. A minimum of ten (10) pipe diameters and five (5) pipe diameters of straight pipe shall be installed upstream and downstream respectively, of the turbine or vortex meter. Some vortex meters require a minimum of thirty (30) pipe diameters and ten (10) pipe diameters of straight pipe shall be installed upstream and downstream respectively.
6. A Y-strainer shall be located upstream of the liquid meter.

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***Volume Computation***

1. The unit of liquid volume shall be one cubic meter at an absolute pressure of 101.325 kPa and at a temperature of 15°C.
2. Volumes of hydrocarbon products measured through orifice metering facilities on the outlet of processing plants shall be determined as per the formulae in Chapter 14.3 of the API Manual of Petroleum Measurement Standards and shall adhere to the requirements of Weights and Measures. Volumes of natural gas liquid products measured through mass metering facilities on the outlet of processing plants shall be determined as per the formulae in Chapter 14.7 of the API Manual of Petroleum Measurement Standards and shall adhere to the requirements of Weights and Measures.
3. Volumes measured by positive displacement, orifice, turbine and mass flow meters shall be calculated as per the applicable formulae in Chapters 12.2, 14.3 and 20 of the API Manual of Petroleum Measurement Standards.
4. Corrections to the volumes measured by positive displacement, and turbine meters shall be made if:
  - The volumes are measured at temperatures other than 15°C, correction to the corresponding volume at 15°C must be made by applying the temperature factor  $C_{td}$ . Tables 53A and 54A in Chapter 11.1 of the API Manual of Petroleum Measurement Standards shall be used to determine this factor. For light hydrocarbons outside of Chapter 11.1's range of 610.5 to 1075.0 kg/m<sup>3</sup>, Table 53 of ASTM-IP-API "Petroleum Measurement Tables for Light Hydrocarbons" can be used for densities between 500 and 653 kg/m<sup>3</sup>.
  - The volumes are measured in the raw gas gathering system at a pressure other than 101.325 kPa, correction to the corresponding volume at 101.325 kPa must be made by applying the pressure correction factor  $C_{pl}$  as per API 12.2. For density ranges between 638.5 and 1074 kg/m<sup>3</sup>, the appropriate correction factor is provided in Chapter 11.2.1M of the API Manual of Petroleum Measurement Standards. For density ranges between 350 and 637 kg/m<sup>3</sup>, the appropriate correction factor is provided in Chapter 11.2.2M.

***Meter Parameter Verification (Configuration File)***

1. When a liquid meter is being calibrated or proved the meter parameters (configuration file) should be verified to ensure measurement values are accurately calculated. These include the appropriate temperature and pressure corrections as described in the Volume Computation section above as well as internal elements, atmospheric pressure, line size, temperature and pressure base, etc.

**ROLES & RESPONSIBILITIES**

Operations Engineers - To select and install liquid measurement devices and equipment in accordance with the requirements of this Policy.

Operators – To maintain the measurement equipment operated in the field in accordance with these requirements. To identify, document, and communicate any deficiencies in a timely manner to the Operations Supervisor. To verify the meter parameters used in the volume calculations.

Operations Supervisor's – To provide Operators support and appropriate training to identify, document and communicate the existence of deficiencies. To ensure deficiencies are appropriately addressed in a timely manner.

Manager Operations – To ensure compliance to this policy is supported.

Measurement Program Steering Committee – To direct and approve measurement policies including this Liquids Measurement Policy.