

Services Request



COMPANY NAME		FAX	
NAME		ADDRESS	
TITLE		CITY	
EMAIL		STATE/PROVINCE	
PHONE	EXT	ZIP/POSTAL	COUNTRY

DATA REQUIREMENTS

Meter owner's name and address (if different than above)

Measurement Canada Registration # (if applicable)

SERVICE / TEST CONDITIONS

TYPE	FLOW RATES %				
<input type="radio"/> 5 Point (Standard)	10%	20%	50%	75%	95%
<input type="radio"/> 2 Point	N/A	20%	N/A	N/A	95%
<input type="radio"/> Other					

METER SPECIFICATIONS

Meter Badge Number

Meter make, model & size

Meter serial number

Number of meters (for multiple meters/types, please use additional quote form)

Flow range

Meter runs provided with meter (provide sketch)

	UNITS	FLOW RATES %				
Flow						
Pressure						
Temperature						
Density*						
Viscosity*						

* Required for Rd test conditions, will be derived from other supplied properties if not given.

TEST REQUIREMENTS / TYPE

Type of test required

Mechanical Electronic Both

COMPOSITION	MOLE %
Natural Gas	
Methane (CH4)	
Ethane (C2H6)	
Propane (C3H8)	
Butane (C4H10)	
Carbon Dioxide (CO2)	
Nitrogen (N2)	
Other fluid (provide name)	

If natural gas composition is not given, a NG composition at a molecular weight of 16.77 will be used to derive missing properties.

ORDER/REPAIR REQUIREMENTS

Repair details

Seal Meters Yes No

Paint Yes No

SHIPPING REQUIREMENTS

Preferred Shipping Company

Carrier Account Number (if applicable)

Turnaround

4 wks 5 days 3 days

ADDITIONAL INFORMATION

Please use separate sheet if needed.

To submit your request or if you have any questions, please contact:

Utility Customers
 Toll Free 1-800-407-8324
 Direct 414-291-6537
 Fax 414-291-6540

Industrial and Gas Transmission Customers
 Toll Free 1-800-992-2364
 Direct 403-259-6220
 Fax 403-259-3377

Quotations will be returned by email or fax.
 (Please specify your preference.)
 Email Fax



Flow Meter Testing

Calibration & Repair Services

Reynolds Number Proving
 (True Service Condition Testing)



Triple Point –
 Where business need, innovative services
 and measurement performance meet.

Reynolds Number Testing

A proven common approach for accurate flow meter calibration.

A unique facility offers a practical solution to Industry need for better flow measurement accuracy.

$$Re = K (Q_f) (\rho) / (D) (\mu)$$

	Imperial Units	SI Units
Flow Rate (Q _f)	ft ³ /hour	m ³ /hour
Density (ρ)	lb _m /ft ³	kg/m ³
Meter diameter (D)	inches	mm
Viscosity (μ)	centipoise	μPa•sec
K	6.3157	0.3537



Facility

The new Terasen Measurement patent pending facility is the first of its kind; able to test flow meters over a wide range of operating conditions using carbon dioxide (CO₂), matched to true operating conditions.

Customer Benefits

Our customers will benefit from Triple Point with:

- More accurate billing for turbine customers
- Established credibility through third party verification
- Immediate access, year round, to accurate test facilities
- Lower test costs
- Faster turnaround times
- Technical Expertise

Test Capabilities

Flow Range	1,000 - 230,000 ACFH (30 - 6,500 m ³ /hr)
Pressure Range	2" - 4" turbine meter
(CO ₂ test medium)	0 - 235 psig (0 - 1,620 kPa)
	6" - 12" turbine meter
	0 - 120 psig (0 - 830 kPa)
Temperature Range	5°C - 45°C (41°F - 113°F)
Fluid Type	CO ₂ or air
Calibration Capabilities	ANSI 150, 300, 600 and meters sized NPS 2 to NPS 12
Measurement Uncertainty	+/- 0.3%
Reproducibility	+/- 0.2%
Traceability	Traceable to international standards through Nmi (Holland Metrology N.V.)
Meter Runs	Complete meter runs up to 22' (6.7 m) by special arrangement

A Solution to more Accurate Turbine Meters

Studies¹ have shown that turbine meters need to be calibrated under in-service conditions for acceptable accuracy. The best calibration results are obtained by matching the in-service Reynolds numbers and flow rates. Reynolds number is a dimensionless ratio of inertial to viscous forces that takes into account the flow rate and physical properties of a fluid. It is proportional to flow rate and density and inversely proportional to meter diameter and viscosity.

The dependency of turbine meters on Reynolds number can have a severe impact on measurement accuracy. Meter performance changes by up to several per cent at lower Reynolds numbers, gradually improving as Reynolds number increases. Meters in low-pressure, low flow applications operate at the lowest Reynolds conditions and suffer the greatest loss of accuracy unless properly calibrated. A small proportion of turbine meters also exhibit a degree of density sensitivity, also at low pressures and flow rates. Such meters may have slightly (usually less than a few tenths of a per cent) different K-factors at different densities, even at equal Reynolds numbers. Triple Point has been designed to be capable of calibrating meters throughout the types of service conditions which can influence their performance.

Studies¹ – Sources

George, D.L., GRI Topical Report GRI-03-0172, "Metering Research Facility Program: Effects of Line Pressure and Gas Density on Turbine Meter Measurement Accuracy at Conditions from Atmospheric Air to 700 psig in Natural Gas". Gas Research Institute, Des Plaines, Illinois, August 2004.

George, Fraser, Nored and Tang, "Carbon Dioxide as a Test Fluid for Calibration of Turbine Meters", American Gas Association Spring Conference 2004, American Gas Association, Washington, D.C., May 2004.

Meter Size	max flow (scfh)	\$ CDN/year (25% Average flow rate)	1% Meter Error Annual Billing Error (25% Average flow rate)	GJ/yr.
4"	86000	\$ 1,440,000	\$ 14,000	2100
6"	143000	\$ 2,400,000	\$ 24,000	3500
8"	285000	\$ 4,801,000	\$ 48,000	6800
8" HC	428000	\$ 7,201,000	\$ 72,000	10300
12"	665000	\$ 11,201,000	\$ 112,000	16000
12" HC	1093000	\$ 18,402,000	\$ 184,000	26300
Operating Pressure (psia)		70		
Delivery Charge (\$/GJ)		\$ 1.00		
Commodity Charge (\$/GJ)		\$ 6.00		
Usage Factor (% max flow)		25%		

Figure 1: Financial implications for just 1% error
Currency is in Canadian dollars.

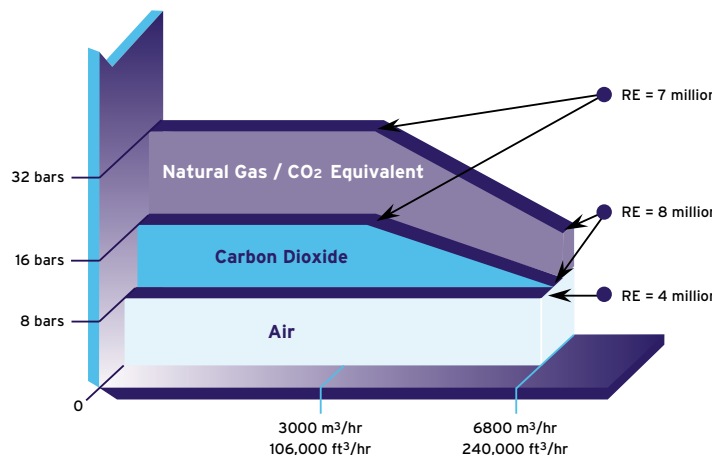


Figure 2: Triple Point Calibration Capabilities

Triple Point Calibration Capabilities

Triple Point can calibrate both normal and extended range meters up to 12 inches diameter to their maximum flow rate in either carbon dioxide or air. Carbon dioxide's density and viscosity properties enable Triple Point to calibrate natural gas meters under Reynolds-matched conditions which replicate natural gas pressures twice those used in carbon dioxide, to a maximum equivalent pressure of 32 bars. The same effect for calibrations in air is very small, owing to the similarity between the ratios of density to viscosity in air and natural gas. See figure 2.



ISO 9001:2000 FS 62389

Contact for Utility Customers



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