

**BEFORE THE**  
**WASHINGTON UTILITIES AND TRANSPORTATION COMMISSION**

WASHINGTON UTILITIES AND  
TRANSPORTATION COMMISSION,

Complainant,

v.

CASCADE NATURAL GAS  
CORPORATION,

Respondent.

DOCKET UG-240008

**CASCADE NATURAL GAS CORPORATION**  
**SEVENTH EXHIBIT TO THE**  
**DIRECT TESTIMONY OF ERIC P. MARTUSCELLI**

**March 29, 2024**

## PURPOSE

Provide a standard procedure for meter sampling.

## REFERENCES

External References:

ANSI B109.1

ANSI B109.2

IUC Service Rules for Gas Utilities: 151-200 Standards for Services

OAR 860-023-0015

WAC 480-90-348

Internal References:

GM0721 –List of Meters for Field Testing

OPS 310 – Large Volume Meters Inspection, Testing, and Maintenance

OPS 508 – Discontinuance of Gas Service

Forms:

23073 – Meter Removal Card

## TRAINING AND QUALIFICATION

Training is required for personnel who prepare meter samples and test meters. Training shall be provided by the Gas Measurement Department Managers or Supervisors.

## RECORD RETENTION

Record	Retention Period	Storage Location
Sample Results	10 years	SharePoint
New Meter Test Results	10 years	MMS

## DEFINITIONS

Refer to OPS 3 Master Glossary

## SCOPE

Includes positive displacement diaphragm meters up to and including 1000 CFH diaphragm meters. For meters with a capacity greater than 1000 CFH and capacity rotary meters refer to [OPS 310 – Large Volume Meters – Inspection, Testing, and Maintenance](#).

This procedure also applies to the quality assurance testing of new diaphragm, rotary, and turbine meter shipments.

## PROCEDURE

### 1. GENERAL

- 1.1. The sampling year shall begin on January 1, and end on December 31, of the same year.
- 1.2. Diaphragm meters with a badged capacity of up to 1000 CFH in service ten (10) or more years, as established by last set date, are eligible for inclusion in the meter family sample.
  - 1.2.1. For Montana, Wyoming, North Dakota, South Dakota, and Minnesota only, diaphragm meters with a badge capacity of up to 650 CFH are included in the meter family sample.
    - 1.2.1.1. Meters larger than 650 CFH shall be tested and adjusted or repaired, if necessary, at a periodic interval of at least once in ten (10) years.

## 2. METER SAMPLING

- 2.1. Gas Measurement identifies the count and distribution of eligible sample meters.
- 2.2. Gas Measurement prepares a meter family sample plan including district meter sampling totals and forwards a copy of the plan to Field Operations Management.
- 2.3. Gas Measurement shall coordinate the batch creation of G-TEST field activities in CC&B.
  - 2.3.1. For smaller meter samples (e.g., less than 50 for a Company) Gas Measurement shall manually create G-TEST field activities in CC&B.
  - 2.3.2. When Gas Measurement administrative personnel is unavailable due to PTO, and the creation and completion of G-TEST field activities is time sensitive (e.g., due prior to the availability of Gas Measurement administrative personnel), Gas Measurement may contact Field Operations for assistance.
- 2.4. Gas Measurement shall coordinate customer notification through automated phone calls and/or postcards per the requirements of [OPS 508 – Discontinuance of Gas Service](#).
- 2.5. Field Operations shall remove the required number of meters and return to the Meter Shop for testing and repair.
  - 2.5.1. Personnel responsible for removing meters shall fill out [Form 23073 - Meter Removal Card](#) prior to returning the meter to the Meter Shop.
  - 2.5.2. The card shall be put in the outlet spud of the meter and the meter capped.
- 2.6. Gas Measurement shall in-test meters removed for sample utilizing Sonic Nozzle Automatic Prover (SNAP).
  - 2.6.1. Non-contaminated, testable meters shall be tested in accordance with ANSI B109.1 and B109.2, using an average of the open and check in-test results to evaluate each meter's performance. For purposes of evaluating the performance of each meter family, the analysis of the test results will exclude data on meters which are damaged, meters which do not register, meters which do not pass gas, and meters which measure either less than 90.0 percent accurate or more than 110.0 percent accurate.
- 2.7. Test results automatically update from SNAP into MMS.

## 3. METER SAMPLE ANALYSIS

- 3.1. Gas Measurement shall run analysis on meter family performance. Refer to [Section 2.6.1](#).
- 3.2. If the results of the test analysis indicate allowable defects for a family are acceptable, no further action is required.
- 3.3. If the allowable defects for a family are exceeded, an analysis of the sample results shall be performed by Gas Measurement Management, or designee, to determine if:
  - 3.3.1. Additional sample collection and testing is warranted, or
  - 3.3.2. The entire lot or only those meters of a specific model, vintage year, installation date, or other factor that may be disclosed to have an effect on the performance of the meters within the lot are to be rejected.
- 3.4. Removal of 100% of unacceptable or rejected lots of meters shall be accomplished within two (2) years from the year in which the rejected sample testing occurred, unless otherwise specified by Utility Commissions.
  - 3.4.1. For Montana, Wyoming, North Dakota, South Dakota, and Minnesota, removal of 100% of unacceptable or rejected lots of meters shall be accomplished within one (1) year from the year in which the rejected sample testing occurred.
- 3.5. Gas Measurement shall submit the results of the testing and analysis to Regulatory Affairs via email no later than mid-February of the following year.
- 3.6. Gas Measurement shall upload a copy of the test results to SharePoint.

## 4. TESTING OF NEW METERS

- 4.1. Gas Measurement shall perform quality assurance testing of new meter shipments purchased from approved manufacturers.
- 4.2. Testing shall be performed prior to acceptance of the shipment and prior to placing meters in active inventory.
- 4.3. Meters shall be tested at open (e.g., 80-120%) and check (e.g., 20-40%).
- 4.4. A meter is considered acceptable if the accuracy is as follows:
  - 4.4.1. Diaphragm Meters
    - 4.4.1.1. The average error at the open and check rates is  $\pm 0.8\%$  or less, and
    - 4.4.1.2. The difference (spread) between the errors found at the open and check rates is not greater than 0.8%.
  - 4.4.2. Rotary and Turbine Meters
    - 4.4.2.1. The average error at the open and check rates is  $\pm 2.0\%$  or less, and
    - 4.4.2.2. The difference (spread) between the errors found at the open and check rates is not greater than 2.0%.
- 4.5. A random number of meters from the shipment shall be selected for testing.
  - 4.5.1. Samples should be selected from multiple pallets when available.
  - 4.5.2. For Washington, Oregon, and Idaho the number of meters shall be based on the size of the lot using the chart in [Appendix 1](#).
  - 4.5.3. For Montana, Wyoming, North Dakota, South Dakota, and Minnesota five percent (5%) of meters from shipments shall be tested. Refer to [Appendix 2](#) for sample sizing chart.
- 4.6. If a shipment is rejected, Gas Measurement Manager shall coordinate with Business Services Department to notify the manufacturer to determine a resolution.
- 4.7. Either the remaining meters in the shipment will be tested and adjusted or the shipment will be returned to the manufacturer for adjustment.

**APPENDIX 1: SAMPLE SIZING CHART (WA, OR, ID)**

**Lot Size 21 - 150**

Process	Cum. Sample Size	Sample Plan	Ac	Re	Determination of Lot Status
Step 1	20	F-Single	0	1	Pass if Ac = 0, otherwise go to Step 2
Step 2	64	H-Double	1	2	Pass if Ac = 1, otherwise lot fails

**Lot Size 151 – 500**

Process	Cum. Sample Size	Sample Plan	Ac	Re	Determination of Lot Status
Step 1	32	H-Double	0	2	Pass if Ac = 0, otherwise go to Step 2
Step 2	64	H-Double	1	2	Pass if Ac = 1, otherwise lot fails

**Lot Size 501 – 1200**

Process	Cum. Sample Size	Sample Plan	Ac	Re	Determination of Lot Status
Step 1	50	J-Double	0	3	Pass if Ac = 0, otherwise go to Step 2
Step 2	100	J-Double	3	4	Pass if Ac < 4, otherwise lot fails

**Lot Size 1201 – 3200**

Process	Cum. Sample Size	Sample Plan	Ac	Re	Determination of Lot Status
Step 1	80	K-Double	1	3	Pass if Ac < 2, otherwise go to Step 2
Step 2	160	K-Double	4	5	Pass if Ac < 5, otherwise lot fails

**Lot Size 3201 – 10000**

Process	Cum. Sample Size	Sample Plan	Ac	Re	Determination of Lot Status
Step 1	125	L-Double	2	5	Pass if Ac < 3, otherwise go to Step 2
Step 2	250	L-Double	6	7	Pass if Ac < 7, otherwise lot fails

Ac = Acceptance Number

Re = Rejection Number

For lot sizes 1-20, all meters in the lot shall be tested.

**APPENDIX 2: SAMPLE SIZING CHART (MT, WY, ND, SD, MN)**

**Lot Size 21 - 150**

Process	Cum. Sample Size	Sample Plan	Ac	Re	Determination of Lot Status
Step 1	5% of lot size	F-Single	0	1	Pass if Ac = 0, otherwise go to Step 2
Step 2	Double the number in step 1.	H-Double	1	2	Pass if Ac = 1, otherwise lot fails

**Lot Size 151 – 500**

Process	Cum. Sample Size	Sample Plan	Ac	Re	Determination of Lot Status
Step 1	5%	H-Double	0	2	Pass if Ac = 0, otherwise go to Step 2
Step 2	Double the number in step 1.	H-Double	1	2	Pass if Ac = 1, otherwise lot fails

**Lot Size 501 – 1200**

Process	Cum. Sample Size	Sample Plan	Ac	Re	Determination of Lot Status
Step 1	5%	J-Double	0	3	Pass if Ac = 0, otherwise go to Step 2
Step 2	Double the number in step 1.	J-Double	3	4	Pass if Ac < 4, otherwise lot fails

**Lot Size 1201 – 3200**

Process	Cum. Sample Size	Sample Plan	Ac	Re	Determination of Lot Status
Step 1	5%	K-Double	1	3	Pass if Ac < 2, otherwise go to Step 2
Step 2	Double the number in step 1.	K-Double	4	5	Pass if Ac < 5, otherwise lot fails

**Lot Size 3201 – 10000**

Process	Cum. Sample Size	Sample Plan	Ac	Re	Determination of Lot Status
Step 1	5%	L-Double	2	5	Pass if Ac < 3, otherwise go to Step 2
Step 2	Double the number in step 1.	L-Double	6	7	Pass if Ac < 7, otherwise lot fails

Ac = Acceptance Number  
 Re = Rejection Number

Example: If the lot size is 500 meters, 25 (e.g., 5%) meters shall be tested. If the lot fails, 50 more meters shall be tested.

For lot sizes 1-20, all meters in the lot shall be tested.

**POLICY STATEMENT**  
**Meter Performance Control**

**ADMINISTRATION**

The Vice President, Engineering & Operations Services of the MDU Utilities Group is responsible for establishing this policy. Administration of this policy is the responsibility of the Director, Policy & Procedures. A designated individual will be further identified in each Company of the development, application and administration of this policy and its provisions.

Reviewed: **Josh Sanders**  
 Director, Policy & Procedures

Digitally signed by Josh Sanders  
 Date: 2023.08.11 08:12:55 -05'00'

Approved: **Pat Darras**  
 Vice President,  
 Engineering & Operations Services

Digitally signed by Pat Darras  
 Date: 2023.08.11 09:13:32 -05'00'

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Date: \_\_\_\_\_

**REVISIONS**

Major Revision Summary	MOC	Date
Initial procedure.	OPSMOC-253	8/17/2023

Minor Revision Summary	MOC	Date