Adjustment of 5-Dial Diaphragm Gas Meters

(Technical SOP and Process Documentation Sample)

Overview
I developed and revised operational process documentation for gas meter testing and adjustment workflows used in a utility meter shop environment.

This document is a sanitized sample of a larger operational procedure used to support meter testing, inspection, adjustment, and disposition workflows for diaphragm gas meters.

The selected sections demonstrate:

- procedural technical writing,
- workflow-based documentation,
- operational process analysis,
- process flowchart development,
- and technical illustration integration.

System names, operational identifiers, and organization-specific information have been generalized or anonymized.

Audience
Meter shop technicians, operations personnel, and technical supervisors responsible for meter testing and adjustment activities.

Business Need
The organization required standardized operational procedures to support:

- consistent meter testing workflows,
- adjustment and disposition decision-making,
- technician guidance,
- and documentation of meter test results.

The project was part of a broader operational knowledge transfer initiative to document critical meter shop procedures prior to the retirement of experienced meter technicians and engineers. More than 60 operational processes were documented to support future training, operational continuity, and process standardization.

My Role
Revised and structured operational procedure documentation, process workflows, and supporting technical illustrations for meter testing and adjustment activities.

Responsibilities included:

- documenting operational meter shop procedures,
- organizing controlled SOP documentation within SharePoint,
- supporting document management and version control practices,
- developing process flowcharts and technical illustrations,
- and standardizing procedural documentation for operational consistency and future training needs.

1. DOCUMENT CONTROL

Item	Description
Document Title	Adjustment Procedure for 5-Dial Diaphragm Gas Meters
Document ID	SOP-MS-004
Version	1.3
Effective Date	May 2026
Prepared By	Technical Documentation
Approved By	Operations Manager
Review Cycle	As Required

2. PURPOSE

2.1 This procedure describes the process for testing and adjusting American 5-dial diaphragm gas meters (models 800TC and 1000TC) (or equivalent models manufactured by Elster American Meter).

2.2 The procedure includes meter intake, pre-inspection, accuracy testing, adjustment of timing or capacity when required, and recording final test results in the meter testing system.

2.3 Meter test results and adjustment data are recorded in the **meter testing system**, which is used to manage meter test records and verify compliance with accuracy specifications.

3. SCOPE

3.1 This procedure applies to meter shop technicians responsible for testing and adjusting American diaphragm gas meters prior to return to service or disposal.

3.2 This procedure excludes field adjustments.

4. RESPONSIBILITIES

4.1 The Measurement Specialist or authorized technician is responsible for performing the procedures described in this document.

5. SAFETY REQUIREMENTS

5.1 Ensure the meter is depressurized and safe to handle prior to beginning adjustment.

5.2 Lockout/tagout

5.3 PPE requirements

5.3.1 Safety glasses

5.4 Static discharge precautions

5.5 Leak verification

6. TOOLS AND MATERIALS

6.1 Test bench

6.2 Calibration device

6.3 Hand tools

6.3.1 Flat screwdriver

6.3.2 Hammer

6.3.3 Drill with Phillips bit

6.3.4 Adjustment wrench

6.3.5 Wire cutters

6.3.6 Impact wrench with 9/16 socket

6.3.7 Nut driver

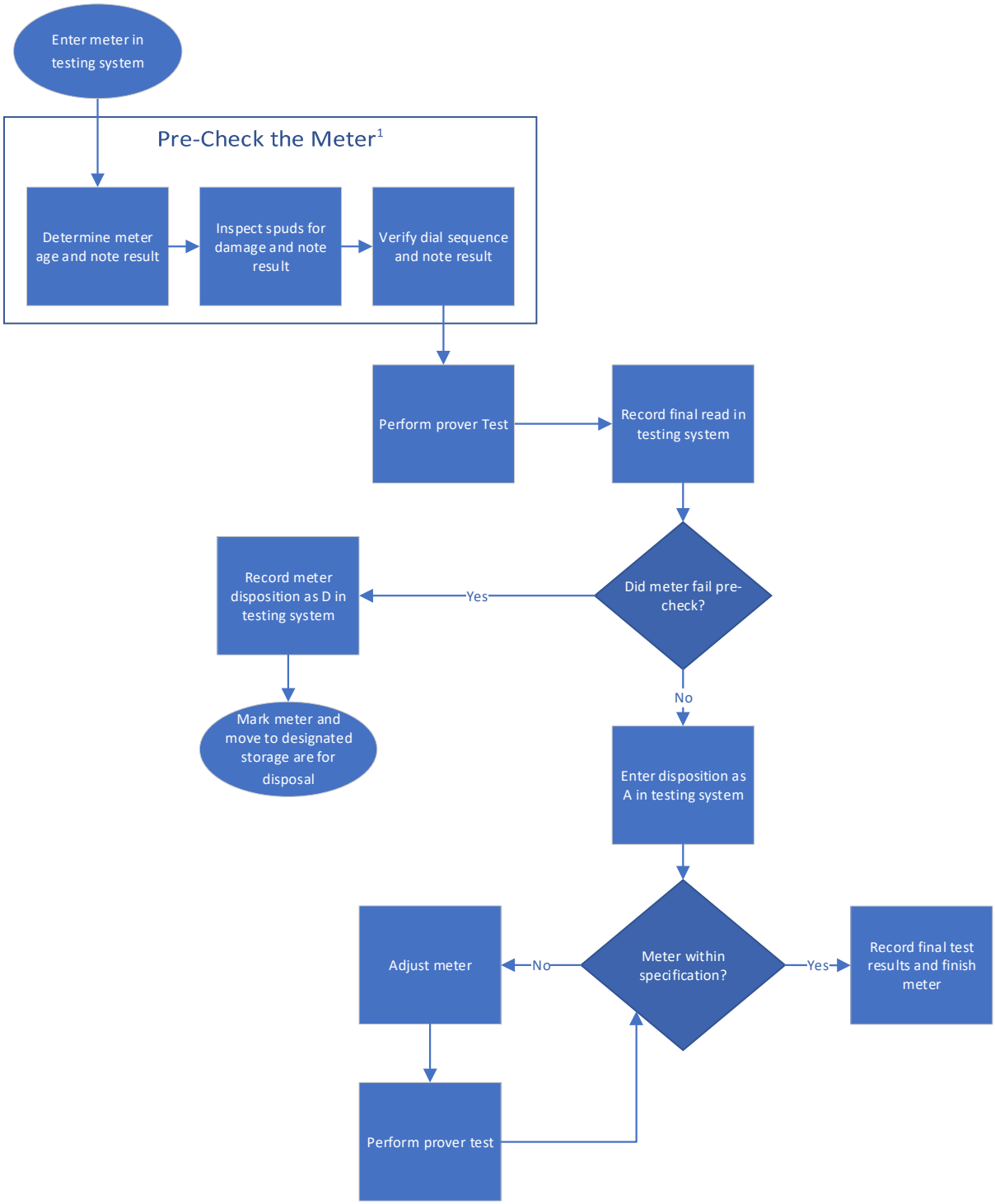
6.4 New gaskets

6.5 New wire seals

7. PROCESS OVERVIEW

The meter testing and adjustment process follows the sequence shown in Figure 1.

Figure 1. Meter testing and adjustment process flow



[1] If the meter fails pre-check, it will not be adjusted and will be disposed of after testing.

8. PROCEDURE

8.1 Determining if Meter Needs Adjustment

8.1.1 Enter the meter in the meter testing system

1. Open the meter testing system.
2. Access the meter proving function.
3. Locate the meter code using the reference documentation at the test station.
4. Enter the meter identification in the meter testing system.
5. Enter the manufacturer in the testing system.
6. Indicate whether the meter is temperature compensated.
7. Select the appropriate proving mode:
    - Enter 1 for Field Meters
    - Enter 2 for New Meters
8. Skip the Mode 3 field.
9. Enter technician identification.
10. In the meter disposal box:
    - Enter Y so that meter can be routed to the designated storage area for meters for disposal.
    - Enter N only if the meter will be routed to the designated storage area for like meters.
11. Submit the form.

8.1.2 Pre-Check the Meter

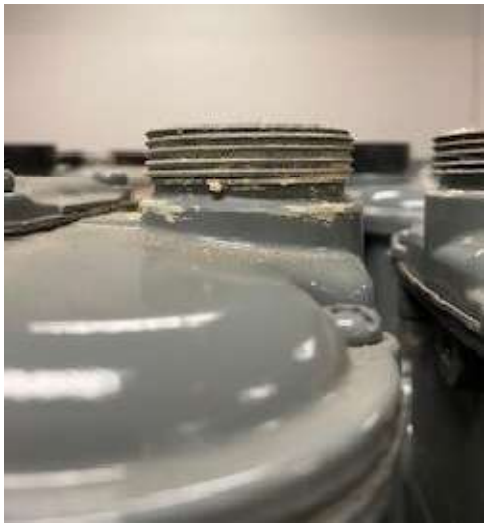
1. Check the meter badge to determine the manufacture date.

Figure 2. Meter badge showing manufacture year

2. Inspect the spuds for signs of wear or damage. If signs of damage are present, the meter will be disposed of after testing. See Figure 3 and Figure 4 for examples of acceptable spud condition.

Figure 3. Spud with no sign of use

Figure 4. Spud with signs of use



3. Verify that all dials are in sequence and that the test hand is functioning. If they are not in sequence, the meter will be disposed of after testing.

Figure 5. Meter dials

8.1.3 Test the meter

1. Perform a prover test on the meter.

2. Determine whether the accuracy is outside specification:

   Note: Refer to APPENDIX A – Meter Accuracy and Spread Specifications.

   - If either the OPEN or CHECK test number falls above or below the specification and the spread between the two numbers is less than or equal to 0.6, the capacity needs to be adjusted.

   - If either the OPEN or CHECK number falls above or below specification and the spread between the numbers is greater than 0.6, the timing must be adjusted first.

3. Determine whether spread (timing) is within specification.

   Note: If the spread between the OPEN and CHECK test numbers is greater than 0.6, the timing needs to be adjusted.

   Note: Adjusting the timing lowers or raises the CHECK to match the OPEN number.

   Important: If the meter is designated for disposal based on the pre-check inspection, the meter will not be adjusted. Record the final read and enter Disposal as the final disposition in the testing system as described in Section 8.2.1. Mark the meter for disposal (Section 9.2) and move it to the designated area in the meter shop. The remaining adjustment steps apply only to meters that remain in service.

8.2 Adjust the Meter

Note: The goal of adjustment is to achieve the midpoint of the acceptable accuracy range.

Note: You may need to repeat the process more than once in order to make sure both Capacity (Accuracy) and Timing (Spread) are within specifications.

8.2.1 Record readings in the meter testing system

1. Access the meter testing system.

2. Enter the meter number, dial reading, and OPEN and CHECK test results.

3. Indicate Yes or No for the following conditions:

   - Internal meter condition present

- Index condition
- Meter Index Sealed
- Pass Gas
- Meter Sealed
- Register condition

4. Enter the meter disposition:
    - If the meter is being **adjusted**, select Adjust as the meter disposition.
    - If the meter is being **disposed of**, select Disposal as the meter disposition.
5. Submit the entry.

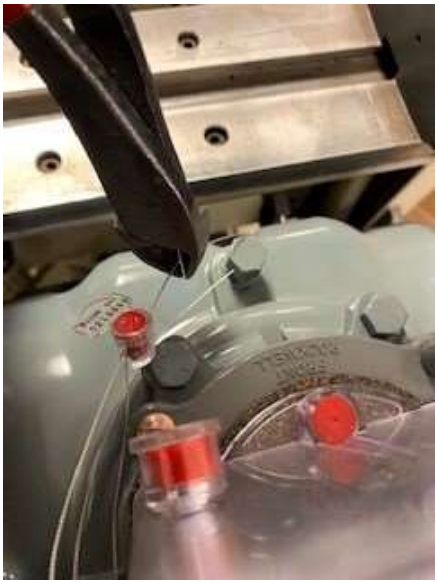
8.2.2 Access the Tangent

1. If the meter has a communication module (AMI module), remove it first in order to access the hand hole cover bolts.

Figure 6. Meter with AMI module

2. Cut the wire and remove the tamper seal.

Figure 7. Cutting wire for tamper seal



3. Remove the 6 bolts holding the hand hole cover using a 9/16 socket attached to the impact wrench.

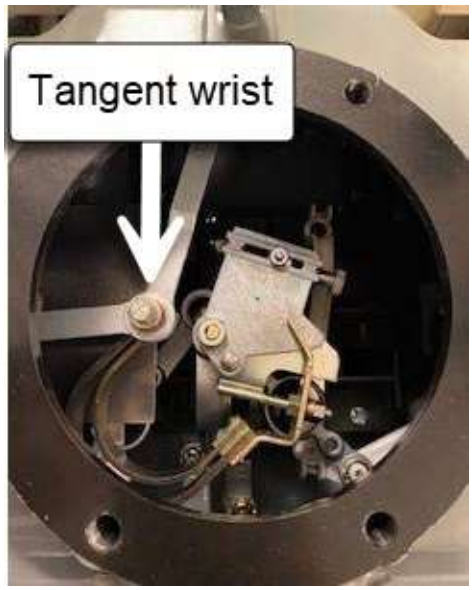
4. Remove the hand hole cover.

5. Discard the gasket.

8.2.3 Adjust Timing (Spread)

1. Move the tangent wrist to access the adjustment screws.

Figure 8. Tangent wrist



2. Compare the OPEN and CHECK test results.

3. Determine whether adjustment is required.

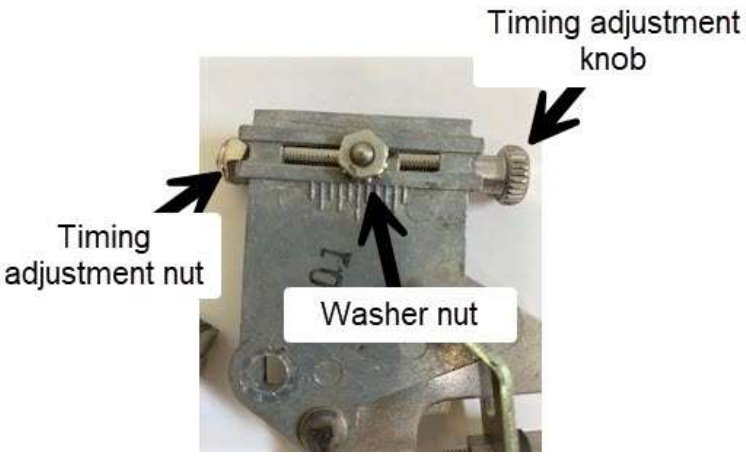
   - If OPEN accuracy is higher than CHECK accuracy, turn the adjustment knob clockwise.

   - If OPEN accuracy is lower than CHECK accuracy, turn the adjustment knob counterclockwise.

4. To adjust timing, loosen the washer nut one counterclockwise turn using a nut driver.

5. Tighten the washer nut to lock the adjustment.

Figure 9. Timing adjustment components



Note: Turning the adjustment nut one flat changes the accuracy by approximately 0.1%.

6. Repeat the prover test.

7. Verify that the test results meet the criteria in APPENDIX A – Meter Accuracy and Spread Specifications.

   Note: If the spread is within specification, proceed to Section 8.2.5.

8.2.4 Adjust Capacity (Accuracy)

1. Move the tangent wrist to access the adjustment screws (see Figure 8).

2. Compare the OPEN and CHECK test results to determine the required adjustment.

   - If OPEN or CHECK readings fall below the acceptable range, increase capacity.

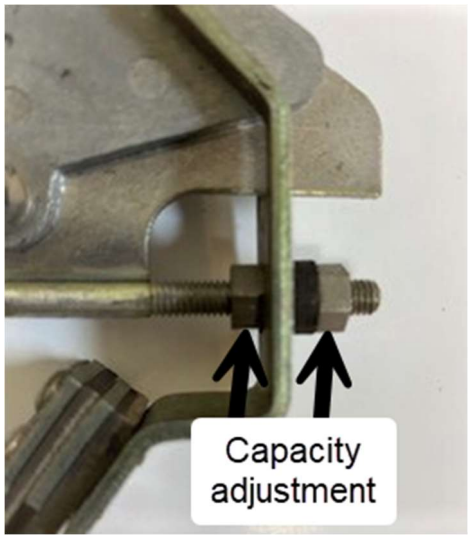
- If OPEN or CHECK readings exceed the acceptable range, decrease capacity.

Note: Ensure the spread is less than or equal to 0.6.

Note: Adjusting the capacity lowers or raises OPEN and CHECK simultaneously.

3. In order to make capacity adjustment and to lower the accuracy numbers (OPEN and CHECK), using an adjustment wrench, loosen the inner nut by turning it counter-clockwise.

Figure 10. Capacity Adjustment



4. Tighten the outer nut by the same amount by turning it clockwise by the same amount.

   Note: Turning each nut two flats will change the OPEN and CHECK rates by 1%.

   IMPORTANT: To increase the accuracy numbers (OPEN and CHECK), do the opposite: loosen the outside nut and tighten the inside nut.

5. Repeat the prover test.

6. Verify that the accuracy meets the criteria in APPENDIX A – Meter Accuracy and Spread Specifications.

7. If the accuracy (capacity) is now within specifications, verify that the spread (timing) is still within specifications as well:

8. If the spread (timing) is still within specifications, proceed to Section 8.2.5.

9. If the spread (timing) is not within specifications, repeat Section 8.2.3 Adjust Timing (Spread).

10. If the accuracy (capacity) is still not within specifications, repeat steps 1 – 5 to make further adjustment.
11. Perform another prover test.
12. Repeat adjustment and testing until readings are within specification.
13. If both accuracy and spread readings are within specification, then proceed to Section 8.2.5.

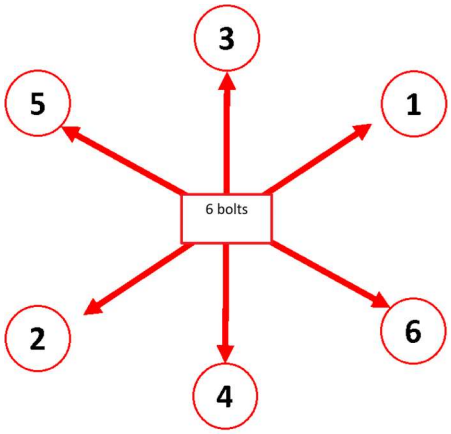
8.2.5 Input final readings in the meter testing system and Finish

1. Exit the proving function in the testing system.
2. Access the meter adjustment function.
3. Enter the meter number.
4. Enter dial readings.
5. Enter final test results.
6. Enter Y or N based on Index Changing.
7. Route the meter for finishing or refurbishment.
8. Install a new gasket.

Figure 11. Gasket

9. Replace and tighten the bolts on the hand hole cover. Tighten the bolts in a cross pattern as seen in Figure 12.

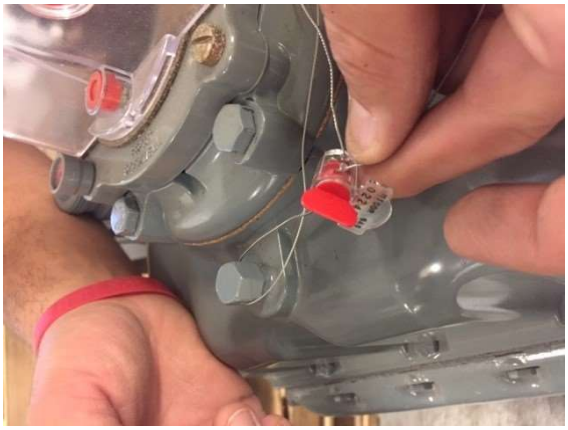
Figure 12. Cross pattern



10. Mark the meter with the final passing test results.

11. Install a new wire seal.

Figure 13. Wire seal



12. Replace the caps on the meter.

13. Move the meter to the designated storage area.

9. RECORDS

9.1 Meter test and adjustment results must be recorded in the meter testing system.

9.2 All meters will be marked with final test results.

10. APPENDIX A – METER ACCURACY AND SPREAD SPECIFICATIONS

10.1 Meter accuracy and timing are evaluated during prover testing to determine whether the meter may be returned to service, adjusted, or removed from service.

Accuracy Range (Flow %)	Max Spread	Disposition
Within nominal tolerance	Small	Accept
Slightly outside nominal tolerance	Moderate	Adjust
Significantly outside nominal tolerance	Not applicable	Remove from service (Disposal)

Notes:

- **Accuracy** represents how closely the meter reading matches the expected flow measurement.
- **Timing (spread)** represents the difference between OPEN and CHECK test readings and indicates synchronization of the meter mechanism.
- Meters that cannot be corrected through adjustment should be removed from service.

11. REVISION HISTORY

Version Number	Purpose/Change	Author	Date	Approved by:
1.0	Initial Document Release	Technical Writer	12/01/2025	Operations Manager
1.1	Added process flowchart	Technical Writer	04/14/2026	Operations Manager
1.2	Updated meter accuracy specifications	Engineering Review	05/03/2026	Operations Manager
1.3	Revised Section 1 wording and formatting	Operations Review	05/04/2026	Operations Manager