



POLICY

SUBJECT: Electronic Revenue Meter Testing

POLICY: DCEC shall maintain and comply with a meter testing plan, which serves to ensure that members' revenue meters report accurate readings for billing purposes. The meter testing plan shall be based on the NYS Department of Public Service Part 92 Operating Manual (March 14, 2003).

PROCEDURE: See attached meter testing plan.

RESPONSIBILITY: Operations Manager

DELAWARE COUNTY ELECTRIC COOPERATIVE, INC.

Adopted by Board of Directors	December 20, 2012
Meter Test Plan for DCEC Updated	March 26, 2013
Reviewed by Board of Directors	October 27, 2015
Revised by Board of Directors	October 24, 2017



Meter Testing Plan for DCEC

Adapted from NYSDPS Part 92 Operating Manual (March 14, 2003 version)

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1. TEST INSTRUMENT CALIBRATION

Watt hour standard instrument or portable meter testing instrument

- Calibrated at regular intervals as recommended by instrument's manufacturer; calibration interval not to exceed one (1) year. Calibration to be traceable to NIST.
- DCEC shall maintain records for each test instrument having calibrations traceable to NIST
- Calibration records must include a calibration history of the instrument, including dates of calibrations, entity performing the calibration, instruments used in the calibration, and the results of the calibration.
- Calibration records must be maintained continuously for two years past the last date of use of the instrument.
- Any repairs to the instrument must be documented and included in the calibration records.
- Each instrument must carry a calibration sticker with the calibration date and the date that the instrument is next due for calibration clearly marked.

2. TEST METHODS

This section defines the test methods that may be used either in the field, shop or laboratory.

Multistator Energy Meters (multistator watt-hour meters)

- All multistator watt-hour meters installed on members' premises shall be removed from service and sent out for testing at least once every 8 years.

Energy Meters (all watt-hour meters)

- At least one test must be made at each load, and if they fail to agree with ANSI specifications, up to four tests shall be made until agreement within 1% is obtained on two consecutive tests.
- If such agreement is not obtained the meter registration shall be reported as "Indeterminate."
- As-left tests shall be made on meters that are to be re-installed or which are to remain in service after replacement of any internal component or adjustment.
- Meter locations should be checked for the presence of vibration and other environmental concerns at the meter location. Steps must be taken to mitigate any problem that may affect the accuracy of the meter.
- Meter wiring connections should be checked for correctness. When conducting a meter test, the voltage of two-wire circuits and the voltages from each line conductor to neutral on three-wire circuits should be noted. Also, the phase sequence of the meter should be noted.
- Current and potential transformers shall be checked for physical and electrical damage.

3. DETERMINATION OF WATT-HOUR METER PERFORMANCE.

- A meter shall be reported as “Not Registering” if for any reason it is found not registering at both the light load and heavy load test points, unless it is damaged.
- The final average percentage registration of a watt-hour meter, also known as final average accuracy, shall be determined by multiplying the average of the test results at heavy load by four, adding the average of the test results at light load and dividing the total by five:
Final Average Accuracy (FAA) = (4 HL+ LL)/5
- When the error of a current or potential transformer, or a combination of such transformers, affects the final average percentage registration of a watt-hour meter by more than +/-0.5%, a correction for such error shall be applied at each test load in the determination of the final average percentage registration of the watt-hour meter.
- A watt-hour meter which integrates the computed iron and copper losses of power transformers and feeder cables together with the customer's use of service shall be adjusted, if necessary, in consideration of the power transformer and line losses.

4. TEST LOADS

All watt-hour meters shall be tested at approximately rated voltage or the manufacturers' recommended voltage and 1.0 power factor at two load points as specified below:

- Heavy load.
Self-contained meters with an “ampere rating” on the nameplate, shall be tested with a load of between 60% and 110% of the “ampere rating”
Self contained Class 60, Class 100, Class 200, Class 320, and Class 400 meters with a “test amperes” rating on the nameplate shall be tested with a load of between 80% and 120% of the “test amperes”

Transformer rated meters shall be tested at approximately 100% of the secondary rating of the current transformers or “test amperes”.

- Light load.
Self-contained meters shall be tested with a load of between 5% and 10% of the “ampere rating” or “test amperes”

Transformer rated meters shall be tested with a load of approximately 10% of the secondary rating of the current transformers or 10% of the “test amperes”.

Electronic watt-hour meters may be tested using a single load point if the following conditions are met:

- The meter uses a technology that does not provide separate adjustments for heavy and light load registration.
- The meter registration curve is linear
- The meter has been tested for linearity and correct registration at multiple points during an evaluation test
- The meter has been approved for test using a single test point as part of the approval process described in 16 NYCRR Part 93

5. WATT-HOUR METER ADJUSTMENT LIMITS.

- When a test of a watt-hour meter indicates that its registration is below 99.2% or above 100.8% at either heavy load or light load at 1.0 power factor, the percentage registration of the meter shall be adjusted to within these limits, as closely as practicable to the condition of zero error. When the errors of the instrument transformers used in conjunction with the meter affect the final average percentage registration of the meter by more than 0.5%, the above limits apply to the meter installation as a whole.
- Some electronic meters do not have adjustments for registration that are available outside of manufacturer’s facilities.

6. RECORDS OF TESTS

- A test record of the most recent test of each watt-hour meter shall be retained for a period of at least 6 years, and the test records of any prior tests shall be retained for a period of at least 2 years.

7. ACCEPTANCE TESTING

- No new watt-hour meter shall be placed in service unless test results indicate a registration between 99.2% and 100.8%.¹
- Performance will be based on the registration of the energy-measuring portion of the meter.
- Each new watt-hour meter shall be subject to a test program prior to installation. The test program must conform as follows:
- Complete testing of a shipment received from the manufacturer.

¹ Landis and Gyr Focus residential class meters are tested by the manufacturer to ensure accuracy no less than +/- 0.5%.

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- Where manufacturer's data is to be accepted, the following conditions must be met:
 - The meter must have been received in a box sealed by the manufacturer of the meter.
 - The meter must be accompanied by a copy of the manufacturer's test report with traceability to NIST, and indicate the results of the final test.
 - Electronic Demand Measuring devices such as electronic recorders, electronic totalizing devices, and electronic registers will not be subject to incoming accuracy tests, but will be subject to checks to insure that no modifications have taken place that might affect performance.
 - Demand performance is one of the parameters used in determination of type approval of a device. That approval is considered sufficient for acceptance of devices unless a change has been made to the device that affects the calculation of demand.

8. IN-SERVICE TESTING

In-service testing is used to ensure that the population of meters continues to perform within standards while monitoring member loads.

Test Requirements – The following requirements define the level of testing that must be performed for each of the specified types:

Single Phase - This category contains all residential and small commercial self-contained meters. (Three phase and CT rated meters are not included in this category). This population may be covered by the following test program:

Selective

The minimum number of meters of this type to be tested in each ensuing calendar year (required rate of test) shall be based on the performance of meters of this type during a 12-month period which shall have terminated not more than 4 months prior to the start of the calendar year according to the selective testing plan rate table included as Appendix A (Test Rates Under Selective Testing Plan).

During the year following the installation of a group of new meters of the same type which have been acceptance tested, such meters shall be tested at the rate of 12.5% of the number of that type in service or 200, whichever is less.

Polyphase Meters - This category contains all three phase and CT rated meters. Meters in this category are frequently used for measuring the consumption of large



commercial or industrial members (demand measuring devices that use electronic methods will not be subject to in-service testing). This population may be covered by the following test program:

Periodic

For those meters covered under this periodic testing category, all watt-hour meters installed on member's premises shall be tested at least once every 8 years.

9. RECORDING REQUIREMENTS

All records of In-Service Tests are to include the number of meters tested, the number of meters found outside of limits, and the size of the total population. Where appropriate, the reports should break down the population of meters by type and be accompanied by appropriate performance parameters for that type.

A record for each individual tested meter is to include the test date, meter serial number, reading at the time of the test, low load performance as found, full load performance as found, low load performance after any adjustment, and full load performance after any adjustment.

10. COMPLAINT TESTING

After the member makes a request for a complaint meter test, it is the responsibility of DCEC to contact the member within 1 business day. DCEC will coordinate a site visit and schedule a date to replace the questionable meter with a known good meter and bring the questionable meter back to the shop for testing. DCEC will report the meter test results to the member within 30 days.

DCEC will coordinate with the member to remove any physical hazards that may restrict ready access to the meter prior to its removal for the complaint test. It is the responsibility of DCEC to contact the member and inform them of the meter removal date

It is also the responsibility of DCEC to determine the following information prior to the test:

- meter location address
- meter serial number
- premise access instructions
- name and telephone number of person(s) to be contacted for test coordination



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- location of meter and main disconnect at the customer's premise
 - service voltage and current ratings
 - desired meter removal date, and time
 - date and result of last meter test

If a meter passes a member requested meter test, the member shall pay a Trip Charge as defined in DCEC's Disconnect Policy in effect at the time the member requested the meter test. The pass/fail criteria are described in numbered paragraph 5 of this Meter Test Plan.



Appendix A

TEST RATES UNDER SELECTIVE TESTING PLAN

Percentage of Meters outside the range of 98.0-102.0% - Final Average Registration (Y)	Percentage of Meters above 102% Final Average Registration (X)													
	0.0	0.1	0.2	0.3	0.4	0.5	0.6	0.7	0.8	0.9	1.0	1.1	1.2	
0.0	0.0													
0.1	0.0	0.2												
0.2	0.0	0.2	0.7											
0.3	0.1	0.2	0.8	1.6										
0.4	0.1	0.3	0.8	1.7	2.9									
0.5	0.2	0.4	0.9	1.8	3.0	4.6								
0.6	0.3	0.4	1.0	1.8	3.1	4.6	6.5							
0.7	0.3	0.5	1.0	1.9	3.1	4.7	6.6	10.0						
0.8	0.4	0.6	1.1	2.0	3.2	4.8	6.7	10.1	11.7					
0.9	0.6	0.7	1.3	2.1	3.4	4.9	6.9	10.2	11.8	12.5				
1.0	0.7	0.9	1.4	2.3	3.5	5.1	7.0	10.4	11.9	12.6	13.0			
1.1	0.8	1.0	1.5	2.4	3.6	5.2	7.2	10.5	12.1	12.8	13.1	13.3		
1.2	1.0	1.2	1.7	2.6	3.8	5.4	7.3	10.7	12.2	12.9	13.3	13.4	13.5	
1.3	1.2	1.4	1.9	2.8	4.0	5.6	7.5	10.8	12.4	13.1	13.4	13.6	13.7	
1.4	1.4	1.5	2.1	2.9	4.2	5.7	7.7	11.0	12.6	13.3	13.6	13.8	13.9	
1.5	1.6	1.8	2.3	3.2	4.4	6.0	7.9	11.2	12.8	13.5	13.8	14.0	14.1	
1.6	1.8	2.0	2.5	3.4	4.6	6.2	8.1	11.4	13.0	13.7	14.0	14.2	14.3	
1.7	2.0	2.2	2.7	3.6	4.8	6.4	8.3	11.7	13.2	13.9	14.3	14.4	14.5	
1.8	2.3	2.4	3.0	3.8	5.1	6.6	8.6	11.9	13.5	14.2	14.5	14.7	14.8	
1.9	2.5	2.7	3.2	4.1	5.3	6.9	8.8	12.2	13.7	14.5	14.8	14.9	15.0	
2.0	2.8	3.0	3.5	4.4	5.6	7.2	9.1	12.5	14.0	14.7	15.1	15.2	15.3	
2.1	3.1	3.3	3.8	4.7	5.9	7.5	9.4	12.7	14.3	15.0	15.3	15.5	15.6	
2.2	3.4	3.6	4.1	5.0	6.2	7.8	9.7	13.0	14.6	15.3	15.7	15.8	15.9	
2.3	3.7	3.9	4.4	5.3	6.5	8.1	10.0	13.4	14.9	15.6	16.0	16.1	16.2	
2.4	4.0	4.2	4.7	5.6	6.8	8.4	10.3	13.7	15.2	16.0	16.3	16.4	16.5	
2.5	4.4	4.6	5.1	6.0	7.2	8.8	10.7	14.0	15.6	16.3	16.6	16.8	16.9	
2.6	4.7	4.9	5.4	6.3	7.5	9.1	11.0	14.4	15.9	16.7	17.0	17.1	17.2	
2.7	5.1	5.3	5.8	6.7	7.9	9.5	11.4	14.8	16.3	17.0	17.4	17.5	17.6	
2.8	5.5	5.7	6.2	7.1	8.3	9.9	11.8	15.1	16.7	17.4	17.7	17.9	18.0	
2.9	5.9	6.1	6.6	7.5	8.7	10.3	12.2	15.5	17.1	17.8	18.1	18.3	18.4	
3.0	6.3	6.5	7.0	7.9	9.1	10.7	12.6	16.0	17.5	18.2	18.6	18.7	18.8	
3.1	7.2	7.4	7.9	8.8	10.0	11.6	13.5	16.8	18.4	19.1	19.5	19.6	19.7	
3.2	8.0	8.1	8.7	9.5	10.8	12.3	14.3	17.6	19.2	19.9	20.2	20.4	20.5	
3.3	8.6	8.8	9.3	10.2	11.4	13.0	14.9	18.3	19.8	20.5	20.9	21.0	21.1	
3.4	9.2	9.3	9.9	10.8	12.0	13.6	15.5	18.8	20.4	21.1	21.4	21.6	21.7	
3.5	9.7	9.8	10.4	11.2	12.5	14.0	16.0	19.3	20.9	21.6	21.9	22.1	22.1	
3.6	10.1	10.2	10.8	11.6	12.9	14.4	16.4	19.7	21.3	22.0	22.3	22.5	22.6	
3.7	10.4	10.6	11.1	12.0	13.2	14.8	16.7	20.1	21.6	22.4	22.7	22.8	22.9	
3.8	10.7	10.9	11.4	12.3	13.5	15.1	17.0	20.4	21.9	22.7	23.0	23.1	23.2	
3.9	11.0	11.2	11.7	12.6	13.8	15.4	17.3	20.6	22.2	22.9	23.2	23.4	23.5	
4.0	11.2	11.4	11.9	12.8	14.0	15.6	17.5	20.9	22.4	23.1	23.5	23.6	23.7	
4.1	11.4	11.6	12.1	13.0	14.2	15.8	17.7	21.1	22.6	23.3	23.7	23.8	23.9	
4.2	11.6	11.7	12.3	13.1	14.4	15.9	17.9	21.2	22.8	23.5	23.8	24.0	24.1	
4.3	11.7	11.9	12.4	13.3	14.5	16.1	18.0	21.4	22.9	23.6	24.0	24.1	24.2	
4.4	11.8	12.0	12.5	13.4	14.6	16.2	18.1	21.5	23.0	23.8	24.1	24.2	24.3	
4.5	11.9	12.1	12.6	13.5	14.7	16.3	18.2	21.6	23.1	23.9	24.2	24.3	24.4	
4.6	12.0	12.2	12.7	13.6	14.8	16.4	18.3	21.7	23.2	23.9	24.3	24.4	24.5	
4.7	12.1	12.3	12.8	13.7	14.9	16.5	18.4	21.7	23.3	24.0	24.4	24.5	24.6	
4.8	12.2	12.3	12.9	13.7	15.0	16.5	18.5	21.8	23.4	24.1	24.4	24.6	24.6	
4.9	12.2	12.4	12.9	13.8	15.0	16.6	18.5	21.9	23.4	24.1	24.5	24.6	24.7	
5.0	12.3	12.4	13.0	13.8	15.1	16.6	18.6	21.9	23.5	24.2	24.5	24.7	24.8	
5.1	12.3	12.5	13.0	13.9	15.1	16.7	18.6	22.0	23.5	24.2	24.6	24.7	24.8	
5.2	12.3	12.5	13.0	13.9	15.1	16.7	18.6	22.0	23.5	24.3	24.6	24.8	24.8	
5.3	12.4	12.5	13.1	13.9	15.2	16.7	18.7	22.0	23.6	24.3	24.6	24.8	24.9	
5.4	12.4	12.6	13.1	14.0	15.2	16.8	18.7	22.0	23.6	24.3	24.7	24.8	24.9	
5.5	12.4	12.6	13.1	14.0	15.2	16.8	18.7	22.1	23.6	24.3	24.7	24.8	24.9	
5.6	12.4	12.6	13.1	14.0	15.2	16.8	18.7	22.1	23.6	24.4	24.7	24.8	24.9	
5.7	12.5	12.6	13.1	14.0	15.3	16.8	18.8	22.1	23.7	24.4	24.7	24.9	24.9	
5.8	12.5	12.6	13.2	14.0	15.3	16.8	18.8	22.1	23.7	24.4	24.7	24.9	25.0	
5.9	12.5	12.7	13.2	14.1	15.3	16.9	18.8	22.1	23.7	24.4	24.7	24.9	25.0	
6.0	12.5	12.7	13.2	14.1	15.3	16.9	18.8	22.1	23.7	24.4	24.8	24.9	25.0	
and above	0.0	0.1	0.2	0.3	0.4	0.5	0.6	0.7	0.8	0.9	1.0	1.1	1.2	and above

Note: When the required test rate is less than 12 1/2%, and the number of meters to be tested is less than 200, the minimum number of meters to be tested shall be either 200 or 12 1/2% of the number in service, whichever is less.