



Montana-Dakota Utilities Co.

A Subsidiary of MDU Resources Group, Inc.

400 N 4th Street
Bismarck, ND 58501

State of Wyoming Electric Rate Schedule

W.P.S.C. Tariff No. 1
Original Sheet No. 185

ELECTRIC METER TESTING PROGRAM Rate 115

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APPLICABILITY:

This rate schedule specifies the protocol to be followed for the testing of electric meters in accordance with Chapter 3, Section 18 of the Commission Procedural Rules and Regulations (Commission Rules).

NEW METERS:

A sampling of 5% of new meters will be tested at full load and at light load. If any meter is found to be off more than $\pm 1\%$, the entire lot will be tested or rejected.

RESIDENTIAL WATTHOUR METERS IN SERVICE:

1. A random selection of meters from each decade – 1980's, 1990's, etc., will be tested annually at full load and light load. The sample size will depend on lot size and will be calculated per Inspection Level V in Military Standards 414 of the Department of Defense. At the time the random selection is made, meters less than five years old and active meters that have been tested in the last five years, will be excluded from the population to be randomly sampled.
2. Full load readings will be given a weighting of 4 and light load readings a weighting of 1 to determine the weighted average values of meter accuracies.
3. The criteria for acceptance shall be: at least 96% of the meters shall be not more than $\pm 2\%$ in error, as determined by the Variability Unknown, Standard Deviation Method described in Military Standards 414 of the Department of Defense.
4. Whenever it is found that less than 96% of the meters in a given vintage class fail to meet the requirements of $\pm 2\%$ error limit, the entire vintage class will be tested and adjusted or, if more economic, replaced within a period of four years. In the event the meter type failing the $\pm 2\%$ error limit may be identified, that meter type, regardless of vintage class, will be tested and adjusted or replaced within a period of four years rather than the entire vintage class.

COMMERCIAL WATTHOUR METER IN SERVICE:

1. A random selection of solid state meters from each decade – 1980's, 1990's, etc. will be tested annually at full load and light load. The sample size will depend on

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- lot size and will be calculated per Inspection Level V in Military Standards 414 of the Department of Defense. At the time the random selection is made, meters less than five years old and active meters that have been tested in the last five years, will be excluded from the population to be randomly sampled.
2. Full load readings will be given a weighting of 4 and light load readings a weighting of 1 to determine the weighted average values of meter accuracies.
 3. The criteria for acceptance shall be: at least 98% of the meters shall be not more than +/- 2% in error, as determined by the Variability Unknown, Standard Deviation Method described in Military Standards 414 of the Department of Defense.
 4. Whenever it is found that less than 98% of the meters in a given vintage class fail to meet the requirements of +/- 2% error limit, the entire vintage class will be tested and adjusted or, if more economic, replaced within a period of two years. In the event the meter type failing the +/- 2% error limit may be identified, that meter type, regardless of vintage class, will be tested and adjusted or replaced within a period of two years rather than the entire vintage class.

INDUSTRIAL WATTHOUR METERS IN SERVICE:

1. A random selection of solid state meters from each decade – 1980's, 1990's, etc. will be tested annually at full load and light load. The sample size will depend on lot size and will be calculated per Inspection Level V in Military Standards 414 of the Department of Defense. At the time the random selection is made, meters less than five years old and active meters that have been tested in the last five years, will be excluded from the population to be randomly sampled.
2. Full load readings will be given a weighting of 4 and light load readings a weighting of 1 to determine the weighted average values of meter accuracies.
3. The criteria for acceptance shall be: at least 99% of the meters shall be not more than +/- 2% in error at both light load and full load, as determined by the Variability Unknown, Standard Deviation Method described in Military Standards 414 of the Department of Defense.

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4. Whenever it is found that less than 99% of the meters fail to meet these requirements, the entire vintage class will be tested and adjusted or, if more economic, replaced within two years. In the event the meter type failing the +/- 2% error limit may be identified, that meter type, regardless of vintage class, will be tested and adjusted or replaced within a period of two years rather than the entire vintage class.

METER TEST EQUIPMENT:

1. All equipment used for testing and calibration shall be cared for and maintained as recommended in the manufacturer's operating and maintenance manuals. Appropriate carrying cases designed for the purpose shall be used when such equipment is transported to and from its normal service location.
2. Meters and other equipment which will be used as a reference standard to certify other equipment shall be kept in a temperature stable environment and shall be calibrated annually except as noted herein.
3. Meters and other equipment which are used as a reference standard shall only be used for calibration purposes, and shall not be used for trouble shooting, corrective maintenance or any other activity which might jeopardize the integrity of the instrument for calibration accuracy.
4. Calibration of the items used by the utility for reference standards shall be accomplished by an instrument with a higher degree of accuracy than the item being calibrated with the accuracy of said instrument being traceable to the National Institute of Standards and Technology (NIST).
5. Current transformers are burden tested at the time the meter is tested. A field test set is connected in series with the secondary of the metering current transformer, at the test switch. The test switch is opened, and the transformer secondary is shorted out. Each current transformer is tested first at the maximum burden, and, if the current drops, the burden is decreased until no change is observed. Appendices with the test set are used to evaluate the results to determine if the current transformer is performing satisfactorily.

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6. Voltage transformers are tested by applying a test voltage to determine if the appropriate ratio is obtained.
7. Whenever any electric meter is tested, the test record shall be preserved, including the information necessary for identifying the meter, the reason for making the test, the reading of the meter upon removal from service and the result of the test, together with all data taken at the time of the test in sufficiently complete form to permit the convenient checking of the methods employed and the calculations for the life of the meter.
8. The Company shall perform meter testing using the equipment identified in the table below.

Type	Manufacturer	Used for	Degree of Accuracy	Calibration Interval
RM-17	Radian	Watt-hour Meter Standard	±0.05%	12 Months
RB-20	Radian	Watt-hour Meter Standard	±0.05%	12 Months

9. The Company shall perform calibration checks on the above identified testing equipment using the equipment identified in the table below.

Type	Manufacturer	Used to Test Equipment Types	Degree of Accuracy	Calibration Interval
RD-21	Scientific Columbus	RM-17 RB-20	See Note 1/	12 Months

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Note 1/:

Accuracy: Errors expressed in percent of reading for normal operating conditions. Guaranteed accuracy specification includes stability, traceability, uncertainty, power factor, and test system errors.

1. Normal Operating Conditions:
 - i. Ambient Temperature: -20°C to 70°C (-4°F to 158°F)
 - ii. Relative Humidity: 0% to 95%
 - iii. Auxiliary Power Voltage: 60 – 600 volts (Autoranging)
 - iv. Frequency: 45 to 65 Hz
 - v. Orientation: Any
2. Influences Affecting Accuracy:
 - i. Temperature influence outside normal operating temperature range per °C: $\pm 0.0005\%$
 - ii. For Power Factors of 100% and 50% output for Whrs, VARhrs, VAhrs: no impact on accuracy
 - iii. For power factor of < 0.5 (PF between - 60° and -90°, then guaranteed accuracy is $\pm 0.02\%/PF$.
10. These instruments are in turn calibrated with higher degree accuracy instruments annually. The highest degree accuracy instruments will be delivered to a manufacturer's facility once each year for calibration with their instruments that are directly traceable to the National Institute of Standards and Technology (NIST).
11. The referenced Military Standards are available for review by the customer by contacting the Company to discuss by phone or to arrange an appointment at the Company's Sheridan office.

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