

From: [aqp7](#)
To: [LARA-MPSC-EDOCKETS](#)
Subject: Public Comments U-18203 & U-18043
Date: Tuesday, May 29, 2018 4:53:27 PM
Attachments: [Proposed Rule changes MPSC U-18043 & U18203.pdf](#)

To whom it may concern,

Please find attached a pdf file with corrections and proposed wording etc. for these dockets. As a Power Quality consultant, as well as working with computers in an IT capacity, I have made suggested clarifications and modifications etc. for the public comment regarding these dockets. Some of the clarifications are very important and I sincerely hope they are taken into consideration as I find some of the initial proposals very concerning.

If you have any questions please don't hesitate to contact me.

Thank you,

Paul Kitzmann

Sent with [ProtonMail](#) Secure Email.

DEPARTMENT OF LABOR AND ECONOMIC GROWTH LICENSING AND
REGULATORY AFFAIRS

PUBLIC SERVICE COMMISSION

TECHNICAL STANDARDS FOR ELECTRIC SERVICE

These rules become effective immediately upon filing with the Secretary of State unless adopted under sections 33, 44, 45a(6), or 48 of 1969 PA 306. Rules adopted under these sections become effective 7 days after filing with the Secretary of State.

(By authority conferred on the public service commission by section 7 of 1909 PA 106, section 2 of 1909 PA 300, section 5 of 1919 PA 419, sections 4 and 6 of 1939 PA 3, and sections 3, 9, and 231 of 1965 PA 380, MCL 460.557, MCL 460.55, MCL 460.4, MCL 460.6, MCL 462.2(12), MCL 16.103, MCL 16.109, MCL 16.331, and Executive Reorganization Order Nos. 1996-2, 2003-1, 2008-4, and 2011-4, MCL 445.2001, MCL 445.2011, MCL 445.2025, and MCL 445.2030.)

R 460.3101, R 460.3102, R 460.3204, R 460.3303, R 460.3304, R 460.3308, R 460.3309, R 460.3409, R 460.3605, R 460.3606, R 460.3608, R 460.3613, R 460.3615, and R 460.3703 of the Michigan Administrative Code are amended, and R 460.3205 is added to the Code, as follows:

PART 1. GENERAL PROVISIONS

R 460.3101 Applicability; purpose; modification; adoption of rules and regulations by utility.

Rule 101. (1) These rules apply to **utility service that is provided by electric utilities that are subject to** the jurisdiction of the public service commission.

(2) These rules are intended to promote safe and adequate service to the public and to provide standards for uniform and reasonable practices by utilities.

(3) These rules do not relieve a utility from any of its duties under the laws of **the** this state of **Michigan. (See R 460.1601(3).)**

(4) Each utility may adopt reasonable rules and regulations governing its relations with customers which it finds necessary and which are not inconsistent with these rules for electric service. Adopted rules and regulations **must** be filed with, and approved by, the commission.

(5) An electric utility or electric customer may petition the commission for a temporary waiver or exception from these rules for good cause shown provided that the waiver or exception is consistent with the purpose of these rules, cannot be done exparte, and must be in writing with documentation and validation.

R 460.3102 Definitions.

Rule 102. As used in these rules:

(a) "Approved by the commission" means that a commission order has been **issued**.

- (b) “Commission” means the Michigan public service commission.
- (c) “Customer” means **an account holder who purchases electric service from a utility. An individual who is a customer must be at least 18 years of age or an emancipated minor.**
- (d) “Electric plant” means all real estate, fixtures, or property that is owned, controlled, operated, or managed in connection with, or to facilitate the production, transmission, and delivery of, electric energy.
- (e) “Electricity meter” means **a device that measures and registers the integral of an electrical quantity with respect to time.**
- (f) “Electro-mechanical meter” means **a meter in which currents in fixed coils react with the currents induced in the conducting moving element, generally a disk or disks, which causes their movement proportional to the energy to be measured. This meter may also be called an induction watt-hour meter.**
- (g) “File” means to deliver to the commission’s executive secretary.
- (h) “Meter” or “watt-hour meter” means **an electricity meter that measures and registers the integral with respect to time of the active power of the circuit in which it is connected. The unit by which this integral is measured is usually the kilowatt-hour.**
- (i) “Metering error” means a failure to accurately measure and record all of the electrical quantities **used** that are required by the applicable rate or rates.
- (j) “Meter shop” means a shop where meters are inspected, repaired, and tested. A meter shop may be at a fixed location or may be mobile.
- (k) “Premises” means an undivided piece of land that is not separated by public roads, streets, or alleys.
- (l) “Solid state meter” means **a meter in which current and voltage act on electronic (solid state) elements to produce an output proportional to the energy to be measured.**
- (m) “Submit” means to deliver to the commission’s designated representative.
- (n) “Utility” means **a firm, corporation, cooperative, association, or other legal entity that is subject to the jurisdiction of the commission and that distributes, sells, or provides electric service.**
- (o) “unsafe” means [insert proper definition].
- (p) “sensitive data” means [insert proper definition].
- (q) “cyber-security” means [insert proper definition].
- (r) “electric demand” means [insert proper definition].
- (s) “dis-aggregation” means [insert proper definition].

PART 2. RECORDS AND REPORTS

R 460.3204 Customer records; retention period; content.

Rule 204. (1) The utility shall retain, **either within the utility or as contracted through a third party with access by the utility, customer** records as necessary to comply with R 460.3309. The

utility shall retain the records for not less than 3 years.

(2) Records for customers must show, if applicable, all of the following information:

- (a) Kilowatt-hour meter reading.**
- (b) Metered kilowatt-hour consumption.**
- (c) Kilowatt, kilovolt ampere, and kilovar meter reading.**
- (d) Kilowatt, kilovolt ampere, and kilovar measured demand.**
- (e) Kilowatt, kilovolt ampere, and kilovar billing demand.**
- (f) Total amount of bill.**

R 460.3205 Security reporting.

Rule 205. (1) For purposes of this rule, “electric provider” means any of the following:

(a) Any person or entity that is regulated by the commission for the purpose of selling electricity to retail or wholesale customers in this state.

(b) A cooperative electric utility in this state.

(2) For purposes of subrule (5) of this rule, “person” means any individual, firm, corporation, educational institution, financial institution, governmental entity, or legal or other entity.

(3) For purposes of subrule (5)(c) of this rule, “denial of service” means, for an electric provider, a successful attempt to prevent a legitimate user or customer from accessing electronic information made accessible by the electric provider or by another party on the behalf of the electric provider.

(4) To inform the commission regarding any and all matters that affect the security and/or safety of persons or property, whether public or private, an electric provider must do both of the following:

(a) Provide a written annual report, individually or jointly with other electric providers, to designated members of the commission staff regarding the electric provider’s cybersecurity program and related risk planning. This report on the threat assessment and preparedness strategy must contain all of the following information:

(i) An overview of the program describing the electric provider’s approach to cybersecurity, and its awareness and protection.

(ii) A description of cybersecurity awareness training plans and implementation for the electric provider’s staff members, specialized cybersecurity training for cybersecurity personnel, and participation by the electric provider’s cybersecurity staff in emergency preparedness exercises in the previous calendar year.

(iii) An organizational diagram of the electric provider’s cybersecurity organization, including positions and contact information for primary and secondary cybersecurity emergency contacts.

(iv) A description of the electric provider’s communications plan regarding unauthorized actions that result in any of the following: any network or grid cyber intrusion, loss of electrical service, customer and utility financial harm, breach of sensitive business or customer data, including the electric provider’s plan for notifying the commission and customers.

(v) A redacted summary of any unauthorized actions that resulted in any network/grid cyber intrusion, material loss of service, financial harm, or breach of sensitive business or customer data including but not limited to customer disaggregation meter data, including the parties that were notified in item (iv above) of the unauthorized action and any remedial actions

undertaken.

(vi) A description of the risk assessment tools and methods used to evaluate, prioritize, correct, and improve cybersecurity, and cybersecurity capabilities.

(vii) General information about current emergency response plans regarding cybersecurity incidents, domestic preparedness strategies, threat assessments, and vulnerability assessments.

(b) In addition to the information required under subrule 1(a) of this rule, an investor owned public utility must include in its Commission annual report a detailed and supporting evidence and documentation of their actual investments in cybersecurity during the previous calendar year and the plans and rationale for investments in projected cybersecurity actions that are anticipated for the next calendar year. [This cannot be a venue for rate hikes etc. for the customers/ratepayers].

(2) As soon as reasonably practicable and prior to any public notification, an electric provider must orally report the confirmation of a cybersecurity incident to a designated member of the commission staff and to the Michigan fusion center, unless instructed otherwise by official law enforcement personnel, if any of the following occurred:

(a) Unauthorized interrupting of the production, transmission, or distribution of electricity through a cybersecurity attack.

(b) Extorting money or other thing of value from the electric provider through a cybersecurity attack.

(c) Where any authorized person has been denied service due to a cybersecurity attack.

(d) Where any unauthorized person accessed or acquired data that compromises the security or confidentiality of personal information maintained by the electric provider as defined by the identity theft protection act, 2004 PA 452, MCL 445.61 to 445.79d, prior to public and customer notification.

(e) At the electric provider's discretion, any other cybersecurity incident, attack, or threat which the electric provider deems notable, unusual, or significant.

PART 3. METER REQUIREMENTS

R 460.3303 Meter reading data.

Rule 303. The meter reading data **must** include all of the following information:

(a) A suitable designation identifying the customer.

(b) Identifying number **and** description of the meter.

(c) Meter readings or, if a reading was not taken, an indication that a reading was not taken.

(d) Any applicable multiplier or constant.

R 460.3304 Meter data collection system.

Rule 304. A meter data collection system that takes data from recording meters **must** indicate all of the following **meter information**:

(a) The date of the record.

(b) The equipment numbers.

(c) A suitable designation identifying the customer.

(d) The appropriate multipliers.

R 460.3308 Standards of good practice; adoption by reference.

Rule 308. In the absence of specific rules of the commission, a utility shall apply the provisions of the publications set forth in this rule as standards of accepted good practice. The following standards are available from the American National Standards Institute (ANSI), Customer Service, 25 West 43rd St., 4th floor, New York, New York, 10036, USA, telephone number: 1-212-642-4900 or via the internet at web-site: <http://webstore.ansi.org> at the cost listed below as of the time of adoption of these rules, plus a handling charge (for paper copies):

(a) American National Standards Institute standards for electricity meters ANSI C12.1-**2014** 2001, cost **\$266.00**, and C12.20-**2010** 2002, cCost **\$94.00** \$120.00.

(b) American National Standards Institute/American Society for Quality Sampling Procedures and Tables for Inspection by Variables for Percent Nonconforming (ANSI/ASQ Z1.9-2003(**R2013**)). Cost **\$179.00** \$100.00.

(c) American National Standards Institute IEEE Standard Requirements for Instrument Transformers (ANSI C57.13-**2016**1993). Cost **\$92.00** \$110.00.

(d) American National Standards Institute IEEE Standard for High Accuracy Instrument Transformers, IEEE Std. C57.13.6-2005. Cost **\$44.00** \$35.00.

(e) The standards adopted in subdivisions (a) to (d) of this rule are also available for inspection at the Michigan Public Service Commission, 6545 Mercantile Way, P.O. Box 30221, Lansing, Michigan, 48909. Copies of these standards may also be obtained from the MPSC at the cost charged by ANSI, plus \$20.00 for shipping and handling.

R 460.3309 Metering inaccuracies; billing adjustments.

Rule 309. (1) An adjustment of bills for service for the period of inaccuracy **must** be made for over registration and may be made for under registration under any of the following conditions:

(a) If an electro- **mechanical** meter creeps, or solid state meter is reading inaccurately.

(b) If a metering installation is found upon any test to have an average inaccuracy of more than 2.0%.

(c) If a demand metering installation is found upon any test to have an average inaccuracy of more than 1.0% in addition to the inaccuracies allowed under R 460.3609.

(d) If a meter registration has been found to be inaccurate due to actual tampering by a person or persons known or unknown.

(2) The amount of the adjustment of the bills for service **must** be calculated on the basis that the metering equipment is 100% accurate with respect to the testing equipment used to make the test which must be in real time with both linear and non-linear loads verifying meter accuracy/precision. The average accuracy of watt-hour meters shall be calculated in accordance with R 460.3616.

(3) If the date when the inaccuracy in registration began can be determined, then that date **must** be the starting point for determining the amount of the adjustment and **is** subject to **R 460.115** subrule (12) of this rule.

(4) If the date when the inaccuracy in registration cannot be determined, then it is assumed that the inaccuracy existed for the period of time immediately preceding discovery of the inaccuracy that is equal to 1/2 of the time since the meter was installed on the present premises, 1/2 of the time since the last test, or 6 years, whichever is the shortest period of time, except as otherwise provided in subrule (5) of this rule and subject to subrule (12) of this rule.

(5) The inaccuracy in registration due to creep in electro-mechanical meters or a solid state meter

reading inaccurately **must** be calculated by timing the rate of the creeping under R 460.3607 or by a Commission documented and verified accuracy standard in the context of the solid state meter in real world and linear and non-linear loads and by assuming that the creeping, or digital inaccuracy, affected the registration of the meter for the period of time immediately preceding discovery of the inaccuracy that is equal to 1/4 of the time since the meter was installed on the present premises, 1/4 of the time since the last test, or 6 years, whichever is the shortest period of time, subject to subrule (12) of this rule.

(6) If the average inaccuracy cannot be determined by test because part, or all, of the metering equipment is inoperative, then the utility may use the registration of check metering installations, if any, or estimate the quantity of energy consumed based on available data. The utility shall advise the customer of the metering equipment failure and of the basis for the estimate of the quantity billed. The same periods of inaccuracy shall **must** be used as explained in this rule.

(7) Recalculation of bill shall be on the basis of the recalculated monthly consumption.

(8) **In the recalculated bill(s) it must** indicate the amount due an existing customer or that more than \$10.00 is due a former customer of the utility, then the utility shall refund the full amount of the difference between the amount paid and the recalculated amount.

(9) Refunds shall **must** be made to the 2 most recent customers who received service through the meter found to be inaccurate. If a former customer of the utility, a notice of the amount of the refund shall **must** be mailed to such customer at the last known address. The utility shall, upon demand made by the customer within 3 months of mailing of the notice, forward the refund to the customer.

(10) If the recalculation of billing as a result of a metering inaccuracy indicates that more than \$1.00 is owed to the utility by an existing customer or that more than \$10.00 is owed to the utility by a former customer, then the utility may issue a bill for the amount, subject to subrule (12) of this rule.

(11) Each utility may establish a policy setting a minimum amount for which it may bill a customer due to under registration that is more than the amounts in subrule (10) of this rule. The minimum amount established in the utility policy shall be applied in all cases of under registration to determine whether the customer will be billed for the amount due the utility because of under registration.

(12) Except in cases of tampering, back billing of customers for metering inaccuracies is limited to the 2-year period immediately preceding discovery of the inaccuracy. The customer shall be given a reasonable time in which to pay the amount of the back billing, after consideration of the amount of the back bill and the duration of the inaccuracy, and service shall not be shut off during this time for nonpayment of the amount of the back billing if the customer is complying with the repayment agreement.

(13) If the solid state meter display is not operating so that the customer cannot determine the energy used the utility shall repair or replace the meter promptly upon discovery of the failure. When only the repair of the failed display of the solid state meter has been made and the meter being found and verified to be recording energy usage correctly then no adjustment is required.

PART 4. CUSTOMER RELATIONS

R 460.3409 Protection of utility-owned equipment on customer's premises.

Rule 409. (1) The customer shall use reasonable diligence to protect utility-owned equipment on the

customer's premises and to prevent tampering or interference with the equipment. The utility may shut off service in accordance with applicable rules of the commission if the metering or external wiring on the customer's premises has been tampered with or altered in any manner that allows unmetered or improperly metered energy to be used unsafely.

(2) If a utility shuts off service for unauthorized use of service, then both of the following provisions shall apply:

(a) The utility may bill the customer for the unmetered energy used and any damages that have been caused to utility-owned equipment.

(b) The utility is not required to restore service until the customer does all of the following:

(i) Makes reasonable arrangements for payment of the charges in subdivision (a) of this subrule.

(ii) Agrees to pay the approved reconnection charges.

(iii) Agrees to make provisions and pay charges for relocating utility-owned equipment or making other reasonable changes that may be requested by the utility to provide better protection for its equipment.

(iv) Provides the utility with reasonable assurance of the customer's compliance with the utility's approved standard rules and regulations.

(3) Failure to comply with the terms of an agreement to restore service after service has been shut off pursuant to subrule (1) of this rule **is** cause to shut off service in accordance with the rules of the utility and the commission.

(4) If service is shut off pursuant to subrule (3) of this rule and the utility must incur extraordinary expenses to prevent the unauthorized restoration of service, the utility may bill the customer for the expenses, in addition to all other charges that may apply under this rule, and may require that the expenses and other charges be paid before restoring service. A reasonable effort **must** be made to notify the customer at the time of shutoff that additional charges may apply if an attempt is made to restore service that has been shut off.

(5) The customer of record who benefits from the unauthorized use shall be **is** responsible for payment to the utility for the energy consumed.

(6) The utility may bill the customer for the reasonable actual cost of the tampering investigation.

PART 6. METERING EQUIPMENT INSPECTIONS AND TESTS

R 460.3605 Metering electrical quantities.

Rule 605. (1) All electrical quantities that are to be metered as provided in R 460.3301 **must** be metered and verified by commercially accepted instruments, which have been tested and have a current certification from the instrument manufacturer for accuracy, are owned and maintained by the utility.

(2) Every reasonable effort **must** be made to measure at 1 point all the electrical quantities necessary for billing a customer under a given rate and which are measured in real world conditions with both linear and non-linear loads.

(3) Metering facilities located at any point where energy may flow in either direction and where the quantities measured are used for billing purposes shall consist of meters equipped with ratchets or other devices to prevent reverse registration and shall be so connected as to separately meter the energy flow in each direction, unless used to implement a utility tariff approved by the commission

for service provided under a net metering program.

(4) **A utility shall not employ** reactive metering for determining the average power factor for billing purposes where energy may flow in either direction or where the customer may generate an appreciable amount of his or her energy requirements at any time, unless suitable directional relays and ratchets are installed to obtain correct registration under all conditions of operation.

(5) All electric service of the same type rendered **by a utility** under the same rate schedule **must** be metered and verified with instruments having like characteristics, except that the commission may be requested to approve the use of instruments of different types if their use does not result in unreasonable discrimination. Either all of the reactive meters which may run backwards or none of the reactive meters used for measuring reactive power under 1 schedule **must** be ratcheted. **This rule is only applicable to equipment owned by the utility.**

R 460.3606 Nondirect reading meters and meters operating from instrument transformers; marking of multiplier on instruments; marking of charts and magnetic tapes; marking of register ratio on meter registers; watthour constants.

Rule 606. (1) Meters that are not direct reading and meters operating from instrument transformers **must** have the multiplier plainly marked on the dial of the instrument or otherwise suitably marked. All charts and magnetic tapes taken from recording meters **must** be marked with the date of the record, the meter number, customer, and chart multiplier, except as in R 460.3304.

(2) The register ratio **must** be marked on all meter registers.

(3) The watthour constant for the meter itself **must** be shown on all watthour meters.

R 460.3608 Demand meters, registers, and attachments; requirements.

Rule 608. **A meter that records, or is capable of recording electric demand, is subject to the requirements of this rule.** A demand meter, demand register, or demand attachment that is used to measure a customer's service shall meet all of the following requirements:

(a) Be in good mechanical and electrical condition.

(b) Have proper constants, indicating scale, contact device, recording tape or chart, and resetting device.

(c) Not register at no load.

(d) Be accurate and verified as such in Rule 460.3309.

R 460.3613 Meter **and metering** equipment testing requirements.

Rule 613. (1) The testing of any unit of metering equipment **must** consist of a comparison of its accuracy with a standard of known accuracy both in real world and real time conditions and with both linear and non-linear loads. Units **that** are not properly connected or **that** do not meet the accuracy or other requirements of these meter and metering equipment rules at the time of testing shall be reconnected or rebuilt to meet such requirements and **must** be adjusted to within the required accuracy and as close to zero error as practicable or else their use shall be discontinued.

(2) Self-contained, **electro-mechanical, solid state**, single-phase, **and all network** meters **must** be in compliance with all of the following requirements:

(a) Be checked for accuracy at unity power factor at the point where a meter is installed, at a central testing point, or in a mobile testing laboratory within a period of from 12 months before, to 60 days after, a meter is placed in service, except as provided for in R 460.3602, and in subrule (3) of this

rule, and not later than 9 months after 192 months of service for a surge-resistant meter and not later than 9 months after 96 months of service for a non-surge resistant meter.

(b) Notwithstanding the provisions of subdivision (a) of this subrule, upon application to the commission and upon receipt of an order granting approval, the testing of self-contained, **electro-mechanical, solid state, single-phase, and all network** meters in service **must** be governed by a quality control plan.

(i) Meters **must** be divided into homogenous groups by manufacturers' types, **and** certain manufacturers' types **must** be further subdivided into separate groups by manufacturers' serial numbers, **solid state** meters must be identified by code type.

(ii) The meters in each homogeneous group **must** then be further subdivided into lots of not less than 301, and not more than **15,000** meters each, except that meters of the most recent design may be combined into lots regardless of manufacturers' type, except that where the number of meters of a single type is 8,001 or more, that number of meters **must** be segregated by types for the formation of lots.

(iii) From each assembled lot, a sample of the size specified in table A-2, ANSI/ASQC Z1.9, **must** be drawn annually. The sample **must** be drawn at random.

(iv) The meters in each sample shall **must** be tested for accuracy pursuant to **paragraphs (v) to (xii) of this rule**.

(v) The test criteria for acceptance or rejection of each lot **must** be based on the test at heavy load only and **must** be that designated for double specification limits and an acceptable quality level (AQL) that is not higher than 2.50 (normal inspection) as shown in table B-3, ANSI/ASQC Z1.9.

(vi) The necessary calculations **must** be made pursuant to Example B-3 of ANSI/ASQC Z1.9. The upper and lower specification limits, U and L, **must** be 102% and 98%, respectively.

(vii) Solid state meters must be tested in real world conditions with linear and non-linear loads. Accuracy must be within 1%.

(viii) A lot **must** be rejected if the total estimated percent defective (p) exceeds the appropriate maximum allowable percent defective (M) as determined from table B-3 as specified in paragraph (v) of this subdivision.

(ix) All meters in a rejected lot **must** be tested within a maximum period of **48** months and shall be adjusted pursuant to the provisions of R 460.3607 or shall be replaced with meters that are in compliance with the requirements of R 460.3607.

(x) During each calendar year, new meter samples **must** be drawn as specified in this subdivision from all meters in service, with the exception that lots that have been rejected **must** be excluded from the sampling procedure until all meters included in the rejected lots have been tested.

(xi) The utility may elect to adopt a mixed variables-attributes sampling plan as outlined in Section A9 of ANSI/ASQC Z1.9, in which case, a lot that is not in compliance with the acceptability criteria of the variables sampling plan shall be resampled the following year using an attributes sampling plan. If the acceptability criteria of the attributes sampling plan are met, then the lot shall be considered acceptable and shall be returned to the variables sampling plan the following year. If the acceptability criteria of the attributes sampling plan are not met, then **the utility shall reject** that lot and all meters in the lot **must** be tested and adjusted or replaced within a maximum period of 36 months after

the second rejection.

(xii) The plan specified in paragraph (x) of this subdivision does not alter the rules under which

customers may request special tests of meters.

(c) Be checked for accuracy in all of the following situations:

(i) When a meter is suspected of being inaccurate or damaged.

(ii) When the accuracy of a meter is questioned by a customer. (See R 460.3601.)

(iii) Before use if a meter has been inactive for more than 1 year after having been in service.

(iv) When a meter has been removed from service and has not been tested within the previous 48 months.

(d) Be inspected for mechanical and electrical faults when the accuracy of the device is checked.

(e) Have the register and the internal connections checked before the meter is first placed in service and when the meter is repaired.

(f) Have the connections to the customer's circuits checked when the meter is tested on the premises or when removed for testing.

(g) Be checked for accuracy at 50% power factor when purchased and after rebuilding.

(h) A meter need not be tested or checked for any reason if the device was tested, checked, and adjusted, if necessary, within the previous 12 months **except when a complaint is received**.

(3) Notwithstanding the provisions of subrules (4)(a)(ii), (5)(a)(ii) and (6)(a)(iii) of this rule, upon application to the commission and upon receipt of an order granting approval, the solid state meters described in subrules (4), (5) and (6) of this rule in service may elect to be governed by a quality control plan as follows:

(a) Meters shall be divided into homogeneous groups by manufacturers' types.

(b) The meters in each homogeneous group shall then be further subdivided into lots of not less than 301, and not more than 10,000, meters each, except that meters of the most recent design may be combined into lots regardless of manufacturers' type, except that where the number of meters of a single type is 8,001 or more, that number of meters shall be segregated by types for the formation of lots.

(c) From each assembled lot, a sample of the size specified in table A-2, ANSI/ASQC Z1.9, shall be drawn annually. The sample shall be drawn at random.

(d) The meters in each sample shall be tested for accuracy pursuant to the provisions of these rules.

(e) The test criteria for acceptance or rejection of each lot shall be based on the test at heavy load only and shall be that designated for double specification limits and an acceptable quality level (AQL) that is not higher than 2.50 (normal inspection) as shown in table B-3, ANSI/ASQC Z1.9.

(f) The necessary calculations shall be made pursuant to Example B-3 of ANSI/ASQC Z1.9. The upper and lower specification limits, U and L, shall be 102% and 98%, respectively.

(g) **When applicable**, a lot shall be rejected if the total estimated percent defective (p) exceeds the appropriate

maximum allowable percent defective (M) as determined from table B-3 as specified in paragraph (e) of this subdivision.

(h) All meters in a rejected lot shall be tested within a maximum period of 48 months and shall be adjusted pursuant to the provisions of R 460.3607 or shall be replaced with meters that are in compliance with the requirements of R 460.3607.

(i) During each calendar year, new meter samples shall be drawn as specified in this subdivision from all meters in service, with the exception that lots that have been rejected shall be excluded from the sampling procedure until all meters included in the rejected lots have been tested.

(j) The utility may elect to adopt a mixed variables-attributes sampling plan as outlined in Section

A9 of ANSI/ASQC Z1.9, in which case, a lot that is not in compliance with the acceptability criteria of the variables sampling plan shall be resampled the following year using an attributes sampling plan. If the acceptability criteria of the attributes sampling plan are met, the lot shall be considered acceptable and shall be returned to the variables sampling plan the following year. If the acceptability criteria of the attributes sampling plan are not met, then that lot shall be rejected and all meters in the lot shall be tested and adjusted or replaced within a maximum period of 36 months after the second rejection.

(k) The plan specified in paragraph (j) of this subdivision does not alter the rules under which customers may request special tests of meters.

(4) All single-phase **instrument rated electro-mechanical** meters that are not included in the provisions of subrule (2) of this rule, together with associated equipment, such as demand devices, control devices and instrument transformer-rated meters, **must** be in compliance with all of the following requirements:

(a) Be checked for accuracy at unity power factor at the point where a meter is installed, at a central testing point, or in a mobile testing laboratory as follows:

(i) Not later than 9 months after 144 months of service for a surge-resistant meter and not later than 9 months after 96 months of service for a non-surge-resistant meter.

(ii) When a meter is suspected of being inaccurate or damaged.

(iii) When the accuracy of a meter is questioned by a customer. (See R 460.3601.)

(iv) Before use when a meter has been inactive for more than 1 year after having been in service.

(b) Be inspected for mechanical and electrical faults when the accuracy of the device is checked.

(c) Have the register and the internal connections checked before the meter is first placed in service and when the meter is repaired.

(d) Have the connections to the customer's circuits checked when the meter is tested on the premises or when removed for testing.

(e) Be checked for accuracy at 50% power factor when purchased and after rebuilding.

(f) A meter need not be tested or checked for any reason if the device was tested, checked, and adjusted within the previous 12 months **except when a complaint is received**.

(5) All self-contained **electro-mechanical and solid state** 3-phase meters and associated equipment shall **must** be in compliance with all of the following requirements. **However, a utility may elect to include self-contained solid state 3-phase meters in service in its quality control plan as provided for in R 460.3613(2)(b). Therefore, a utility may be exempt from the periodic meter test requirements as provided in subrule (4)(a)(ii) of this rule.**

(a) Be tested for accuracy at unity and 50% power factor as follows:

(i) Before being placed in service.

(ii) Not later than 96 months after 120 months of service.

(iii) When a meter is suspected of being inaccurate or damaged.

(iv) When the accuracy of a meter is questioned by a customer. (See R 460.3601.)

(v) When a meter is removed from service.

(b) Be inspected for mechanical and electrical faults when the accuracy is checked.

(c) Have the register and internal connections checked before the meter is first installed, when repaired and when the register is changed.

(d) Have the connections to the customer's circuits and multipliers checked when the equipment is tested for accuracy on the customer's premises.

(6) All transformer-rated electro-mechanical and solid state 3-phase meters and associated equipment must be in compliance with all of the following requirements. However, a utility may elect to include transformer-rated solid state 3-phase meters in service in its quality control plan as provided for in R 460.3613(2)(b). Therefore, a utility may be exempt from the periodic meter test requirements as provided in subrule (5)(a)(iii) of this rule.

(a) Be checked for accuracy at unity and 50% power factor as follows:

(i) Before being placed in service.

(ii) On the customer's premises within 60 days after installation, unless the transformers are in compliance with the specifications outlined in the American National Standards Institute standard ANSI C-57.13, and unless the meter adjustment limits do not exceed plus or minus 1.5% at 50% power factor.

(iii) Not later than 9 months after 72 months of service.

(iv) When a meter is suspected of being inaccurate or damaged.

(v) When the accuracy is questioned by a customer. (See R 460.3601.)

(vi) When a meter is removed from service.

(b) Be inspected for mechanical and electrical faults when the accuracy is checked.

(c) Have the register and internal connections checked before the meter is first placed in service and when the meter is repaired.

(d) Have the connections to the customer's circuits and multipliers checked when the equipment is tested for accuracy on the premises or when removed for testing and when instrument transformers are changed.

(e) Be checked for accuracy at 50% power factor when purchased and after rebuilding.

(7) A utility must [shall] test instrument transformers in all of the following situations:

(a) When first received, unless a transformer is accompanied by a certified test report by the manufacturer.

(b) When removed from service.

(c) Upon complaint.

(d) When there is evidence of damage.

(e) When an approved check, such as the variable burden method in the case of current transformers that is made when the meter is tested indicates that a quantitative test is required.

(8) Demand meters must be in compliance with both of the following requirements:

(a) Be tested for accuracy in all of the following situations:

(i) Before a meter is placed in service.

(ii) When an associated meter is tested and the demand meter is a block interval nonrecording type or a thermal type.

(iii) After 2 years of service if the meter is of the recording type, but testing is not required if the meter is of the pulse-operated type and the demand reading is checked with the kilowatt-hour reading each billing cycle.

(iv) When a meter is suspected of being inaccurate or damaged.

(v) When the accuracy is questioned by a customer. (See R 460.3601.)

(vi) When a meter is removed from service.

(b) Be inspected for mechanical and electrical faults when a meter is tested in the field or in the meter shop.

R 460.3615 Metering equipment records.

Rule 615. (1) **A utility shall maintain a** complete record of the most recent test of all metering equipment. The record **must** show all of the following information:

- (a) Identification and location of unit.
 - (b) Equipment with which the device is associated.
 - (c) The date of test.
 - (d) Reason for the test.
 - (e) Readings before and after the test.
 - (f) A statement as to whether or not the meter creeps and, in case of creeping, the rate.
 - (g) A statement of meter accuracies before and after adjustment sufficiently complete to permit checking of the calculations employed.
 - (h) Indications showing that all required checks have been made.
 - (i) A statement of repairs made, if any.
 - (j) Identification of the testing standard and the person making the test.
- (2) The utility shall also keep a record of each unit of metering equipment which shows all of the following information:
- (a) When the unit was purchased.
 - (b) The unit's cost.
 - (c) The company's identification.
 - (d) Associated equipment.
 - (e) Essential nameplate date **and data**.
 - (f) The date of the last test. The record **must** also show either the present service location with the date of installation or, if removed from service, the service location from which the unit was removed with the date of removal.

PART 7. STANDARDS OF QUALITY OF SERVICES

R 460.3703 Voltage measurements and records.

Rule 703. (1) **A utility shall make** voltage measurements shall be made at the utility's service terminals.

(2) Each utility shall make a sufficient number of voltage measurements, using manufacturer verified and certified recording voltmeters, to determine if voltages are in compliance with the requirements stated in R460.3702.

(3) All records obtained under subrule (2) of this rule **must** be retained by the utility for not less than 2 years and **must** be available for inspection by the commission's representatives. The records shall indicate all of the following information:

- (a) The location where the voltage was measured.
- (b) The time and date of the measurement.
- (c) The results of the comparison with an indicating voltmeter at the time a recording meter is set.