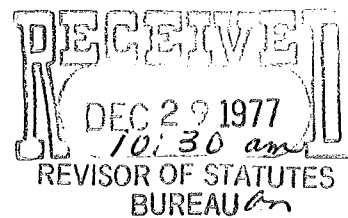


PSC 113

CERTIFICATE



STATE OF WISCONSIN )  
 )  
PUBLIC SERVICE COMMISSION) ss.

TO ALL WHOM THESE PRESENTS SHALL COME, GREETINGS:

I, Lewis T. Mittness, Executive Secretary of the Public Service Commission of Wisconsin, and custodian of the official records of said Commission, do certify that the annexed rules relating to Service by Electric Utilities were duly approved and adopted by this Commission on December 22, 1977.

I further certify that this copy of the rules has been compared by me with the original on file in this Commission and that the same is a true copy thereof, and of the whole of such rules.

IN TESTIMONY WHEREOF, I have hereunto set my hand and affixed the official seal of the Commission at the Hill Farms State Office Building in the City of Madison this 27 day of December, 1977.

Lewis T. Mittness

Lewis T. Mittness  
Executive Secretary  
PUBLIC SERVICE COMMISSION OF WISCONSIN

BEFORE THE

PUBLIC SERVICE COMMISSION OF WISCONSIN

In the Matter of Proposed Revision of )  
Chapter PSC 113, (Service Rules for )  
Electric Utilities), Wis. Adm. Code )  
(Revision of Part 1, Section PSC ) 1-AC-12  
113.17 of Part III, Parts IV through )  
Part IX, and Creation of Part X )

ORDER OF THE PUBLIC SERVICE COMMISSION  
ADOPTING, AMENDING, AND REPEALING RULES


Pursuant to authority vested in the Public  
Service Commission of Wisconsin by sections 196.02, 196.16,  
196.37 and 227.014, Stats., the Public Service Commission  
hereby adopts, amends, and repeals rules as follows:

Chapter PSC 113, Wis. Adm. Code is  
amended as indicated in the attached  
appendix.

The amendments to ch. PSC 113, Wis. Adm. Code  
created herein shall take effect on the first day of the  
month following their publication in the Wisconsin Administrative  
Register, as provided in section 227.026(1), Stats.,

Dated at Madison, Wisconsin, DEC 22 1977

By the Commission.

  
\_\_\_\_\_  
Lewis T. Mittness  
Executive Secretary

## APPENDIX

### Chapter PSC 113 SERVICE RULES FOR ELECTRICAL UTILITIES

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- PSC 113.45 Accuracy and calibration of test standards
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Part X AUXILIARY METERING DEVICES

- PSC 113.60 Phase-shifting transformers
- PSC 113.61 Transformer-loss compensators

(1) Sec. PSC 113.04(2) is amended as follows:

(2) The time switches used by the utility for controlling equipment such as water heaters, street lights, etc., shall be of such quality that the timing mechanism may be adjusted so as to be accurate within 10 minutes per month. Time switches used by the utility for controlling street lighting or display lighting shall be inspected or operation observed at least once a ~~month~~ each 3 months and if in error, adjusted, and also adjusted upon complaint if found in error or when service interruptions cause them to be in error by one-half hour or more. Time switches used by the utility for controlling off-peak appliances shall be inspected or operation observed when the utility reads the meter and when the meter is tested and adjusted if in error, and also adjusted upon complaint if found in error or whenever service interruptions result in error of 2 hours or more or in supplying service to off-peak appliances during peak periods.

(2) Sec. PSC 113.04(3) is repealed and recreated as follows:

(3) Load-control systems utilizing a central signaling source to operate equipment on the customers' premises for directly or indirectly controlling customer loads shall be tested as follows:

(a) The central signalling source shall be tested for proper signal output in accordance with procedures as filed with and accepted by the commission.

(b) The receiver-control devices at the customers' premises shall be tested according to procedures as filed with and accepted by the commission. At the minimum such tests shall include an annual sample testing of the various types of devices in use (sufficient to determine whether each of the various types of devices is performing satisfactorily), and a test of any unit suspected to have failed or which is the subject of a customer complaint.

(c) Each utility shall file with the commission appropriate test procedures in accordance with preceding paragraphs (a) and (b) within 12 months after placing each load-control system in use. The initial filing may consist of temporary procedures to be observed until the capabilities of the particular system are determined from experience.

(3) Sec. PSC 113.04(4) is created to read:

(4) Other control devices used by the utility to control loads shall be checked periodically.

(4) Sec. PSC 113.055(intro), (1), and (2) are repealed and recreated to read:

PSC 113.055 Protection of utility facilities. A public utility upon receiving notice as provided in section 66.047 or section 182.0175(2)(e), Stats., of work which may affect its facilities used for serving the public shall:

(1) If the notice is of work covered by section 66.047, Stats., investigate and decide what action, if any, must reasonably be taken to protect or alter utility facilities in order to protect service to the public and to avoid unnecessary damage. The utility shall take such action as is reasonably necessary to protect, remove, alter, or reconstruct its facilities, and shall perform such work with reasonable dispatch taking into account the conditions to be met. Nothing in this rule shall be deemed to affect any right which the utility may have to require advance payment or adequate assurance of payment of the reasonable cost thereof to the utility by the property owner or contractor.

(2) If the notice is of work covered by section 182.0175(2)(e), Stats., and is not covered by section 66.047, the utility shall respond as required by section 182.0175(2)(e).

(5) Sec. PSC 113.057 is repealed and recreated as follows:

PSC 113.057 Interference with public service structures.

(1) A utility having any work upon, over, along, or under any public street, highway or private property near existing utility facilities shall give reasonable notice to the other utility and shall exercise care when working in close proximity to such existing facilities. Sections 66.047 and 182.0175, Stats., shall be observed where applicable. In all other cases such notice shall provide the other utility with a reasonable opportunity to protect or alter its facilities and such work shall not proceed without an agreement concerning the location and nature of the proposed work.

(2) Nothing in the above shall prevent a utility from proceeding as quickly as possible with any emergency construction work which might interfere with existing facilities. (Also see sec. 182.0175(2)(d), Stats.)

(6) Sec. PSC 113.06 is amended to read:

PSC 113.06 Standard voltages and utilization equipment.

(1) All utilities shall have available a tabulation showing the character and type of electric service supplied, including the secondary and, where applicable, primary voltages.

(2) ~~Street-lamp-bulbs~~ Lamps used or furnished by the utility for highway or area illumination shall initially be such that the customer receives the proper illumination in lumens specified in the rate. If the street lighting rate is based on wattage, or if the utility furnishes lamps to customers free or at reduced cost, the lamp bulbs shall be of such efficiency in lumens per watt when used on the utility's circuits that customers may obtain their lighting service under the most favorable conditions practicable under the rate schedule.

(7) Sec. PSC 113.07 is amended as follows:

PSC 113.07 Tamper-resistant equipment. Where electrical energy has been diverted or the utility's equipment for measuring the service or controlling a customer's load has been interfered with, the utility may require the customer to install entrance and service equipment to prevent current diversion or interference with the metering ~~equipment~~ or control equipment.

Note: Care should be taken in determining the existence of diversion and amount of energy diverted. In case check-meters are used, the possibility of grounds between meters, normal meter inaccuracies, and incorrect connections of meters should not be overlooked. The requirements of the Wisconsin state electrical code for entrances should effectively prevent such diversion. Attention is directed to sections 939.32 and 943.20, Stats. ~~(Section 98.257-Wis-Stats-7-was-repealed-by-chapter-6597-laws-of-1961-7)~~

(8) Sec. PSC 113.09<sup>(1)</sup> is amended to read:

PSC 113.09 Change in type of service. (1) If a change in type of service, such as from 25 to 60 ~~cycle-or-from-direct-to-alternating~~ hertz, current, or a change in voltage to a customer's substation, is effected at the insistence of the utility and not solely by reason of increase in the customer's load or change in the character thereof, the utility shall share equitably in the cost of changing the equipment of the customers affected as determined by the commission in the absence of agreement between utility and customer.

Note: The change in customer's equipment should be made with the greatest possible economy to the customer, and final settlement made at the time of the change. Substantially the following basis was prescribed by the commission in Jackman v. Janesville Electric Co., 17 W.R.C.R. 356, and has been customarily adopted as the basis for settlement:

Payment by the utility to the customer of:

1. The remaining value of the customer's electrical equipment which is made obsolete;
2. The cost of making the resulting necessary change in interior wiring; and
3. The cost of installing the new equipment and removing the old, less the salvage value of such equipment as the customer retains.

(9) Secs. PSC 113.101(4) and (5)(a) are amended as follows:

(4) Where the utility's distribution facilities supplying the customer using a welder are reasonably adequate and of sufficient capacity to carry other loads normally imposed, variations in the voltage of the utility's supply to such customer caused by his welder in excess of the limits set in sections PSC 113.25, and ~~113.28(3)~~ 113.26 and 113.27 shall not be considered a violation of such order by the utility.

(5) Electric welders not larger than the sizes set forth below and used under the conditions specified shall be served without charges other than applicable to the customer's other service on the same circuit.

(a) All classes of customers in any area. 110-120 or 220-240 volt electrical welders which can be operated on circuits fused at not to exceed 15 amperes and without causing violations of sections PSC 113.25, and ~~113.28(3)~~ 113.26 and 113.27 at other customers' service entrances on a reasonably adequate secondary.

(10) Sec. PSC 113.102 is created to read:

PSC 113.102 Radio and television interference.

(1) Each utility shall own or otherwise arrange to have available when needed, suitable monitoring equipment for surveying its lines and equipment for possible radio and/or television interference.

(2) Each utility shall establish and routinely utilize in the course of its regular operation, means whereby the presence of radio and/or television interference may be detected.

(3) Each utility shall, upon notification or detection of the presence of radio and/or television interference, survey its lines and equipment for possible sources of radio and television interference. When significant interference is found, reasonable measures shall be taken to locate the source and, if on the utility's system, to mitigate the interference.



(4) Where the source of interference is determined to be equipment owned by a specific customer, the customer shall be so advised and informed of his responsibility to correct the problem (see PSC 113.015).

(11) Sec. PSC 113.103 is created to read:

PSC 113.103 Planned service interruptions.

(1) Unless conditions of an actual or potential emergency nature require otherwise, each utility shall strive to give reasonable advance notice to affected customers of each planned service interruption expected to last more than 30 minutes. No such notification is necessary when applying load control or on-peak control systems.

(2) Whenever feasible, interruptions expected to last more than 1 hour and affect more than 100 customers, or interruptions to critical loads, shall be scheduled for periods which will cause a minimum of customer inconvenience.

(12) Sec. PSC 113.17 is amended to read:

PSC 113.17 Adjustment-of-bills. Adjustment of bills for metering inaccuracies. (1) Whenever a meter creeps or whenever a ~~var~~ varhour meter or wathour meter installation, with or without pulsing devices and recording equipment, is found upon test to have an average error of more than 2% from 100%, or a demand metering installation more than 1.5% plus the errors allowed in section PSC 113.41 from 100%, a recalculation of bills for service shall be made for the period of inaccuracy. The recalculation shall be made on the basis that the service meter should be 100% accurate with respect to the working test standard. (See PSC 113.435 Determination of average meter error.)

(2) (a) If the period of inaccuracy cannot be determined, it shall be assumed that the metering equipment has become inaccurate at a uniform rate since it was installed or last tested except as otherwise provided in (b) and (c) below.

(b) Recalculation of bills shall be on the basis of actual bills except that if the monthly consumption has been reasonably uniform, averaged less than 500 kw, kW hrs. per month and involves no billings other than for kw kW hrs., the recalculation of bills may be based on the average monthly consumption and the inaccuracy may be assumed to have existed for a period equal to one-half the time elapsed since the meter was installed or since the last previous test, whichever is later.

(c) The error in registration due to "creep" shall be calculated by timing the rate of "creeping" and assuming that this creeping affected the registration of the meter for 25% of the time since the last test or since the meter was installed.

(d) When the average error cannot be determined by test because of failure of part or all of the metering equipment, it shall be permissible to use the registration of ~~check-metering~~, check-metering installations, if any, or to estimate the quantity of energy consumed based on available data.

(3) If the recalculated bills indicate that more than \$1 is due an existing customer or \$2 is due a person no longer a customer of the utility, the full amount of the calculated difference between the amount paid and the recalculated amount shall be refunded to the customer. The refund to an existing customer may be in cash or as credit on a bill. If a refund is due a person no longer a customer of the utility, a notice shall be mailed to the last known address and the utility shall upon demand made within 3 months thereafter refund the amount due.

(4) If the recalculated bills indicate that more than \$10 is due, the utility may bill the customer for the amount due. ~~The amount must be billed separately on a form different than the normal bill form and a complete explanation of the billing must be given. Any amounts paid by a customer which are not specifically paid on such a bill must be applied to the customer's last regular bill for service. The charge shall not show as arrears on any bill for service.~~ For residential customers the period of backbilling shall not exceed 24 months unless there is evidence of fraud or deception.

(5) A classified record shall be kept of the number and amount of refunds and charges made because of inaccurate meters, misapplication of rates, and erroneous billing. The record for a calendar year shall be submitted to the commission by April 1 of the following year.

(13) Ch. PSC 113, Part IV (Title) is amended to read:

REQUIREMENTS-AS-TO UTILITY RECORDS  
AND INTERRUPTIONS OF SERVICE

(14) Sec. PSC 113.20 is amended as follows:

PSC 113.20 Maps and diagrams. Each utility shall have ~~maps, records, diagrams, and drawings~~ record systems (maps, records, diagrams, drawings or computer display systems) showing the location of its property, in sufficient detail so that the adequacy of service to existing customers may be checked and facilities located.

(15) Sec. PSC 113.22(1) is amended to read:

PSC 113.22 Interruptions of service. (1) Each utility shall keep a record of all interruptions to service affecting the entire distribution system of any single community or an important division of a community, and include in such record the date and time of interruption, the date and time of restoring service, and, when known, the cause of each interruption. location, date and time of interruption, the duration, the approximate number of customers affected, the circuit or circuits involved, and, when known, the cause of each interruption.

(16) Secs. PSC 113.22(3)-(5) are created to read:

(3) Each utility shall notify the commission of any event described in (a), (b), (c), (d) or (e) involving bulk power supply facilities (any generating unit or electric facilities operating at a nominal voltage of 69 kV or higher):

(a) Any interruption or loss of service to customers for 15 minutes or more to aggregate firm loads in excess of 200,000 kW. Such notification shall be made by telephone as soon as practicable without unduly interfering with service restoration and, in any event, within one hour after beginning of the interruption. A confirming written report shall be submitted within two weeks.

(b) Any interruption or loss of service to customers for 15 minutes or more to aggregate firm loads exceeding the lesser of 100,000 kW or half of the current annual system peak load and not required to be reported under (a). Such notification shall be made by telephone no later than the beginning of the commission's next regular work day after the interruption occurred. A confirming written report shall be submitted within two weeks.

(c) Any decision to issue a public request for reduction in use of electricity. Notification of such decision shall be made by telephone at the time of issuing such request. A confirming written report shall be submitted within 2 weeks.

(d) Any action to reduce firm customer loads by reduction of voltage for reasons of maintaining adequacy of bulk electric power supply. Notification of such action shall be made by telephone at the time of taking such action. A confirming written report shall be submitted within 2 weeks.

(e) Any action to reduce firm customer loads by manual switching, operation of automatic load shedding devices, or any other means for reasons of maintaining adequacy of bulk electric power supply. Notification of such action shall be made by telephone at the time of taking such action.

(4) Each utility shall notify the commission of service interruptions not involving bulk power supply facilities as follows:

(a) Interruptions of 60 minutes or more to an entire distribution substation bus or entire feeder serving either 500 or more customers or entire cities or villages having 200 or more customers shall be reported within two weeks by a written report.

(5) The written reports of (3) and (4) above shall include the date, time, duration, general location, approximate number of customers affected, identification of circuit or circuits involved, and, when known, the cause of the interruption. When extensive interruptions occur, as from a storm, a narrative report including the extent of the interruptions and system damage, estimated number of customers affected, and a list of entire communities interrupted may be submitted in lieu of reports of individual interruptions.

(17) Sec. PSC 113.23(3) is amended to read:

(3) Each utility shall summarize yearly in a combined tabulation all individual meter and overall light and heavy load "as found" tests at the power factors as required by these rules. This summary shall be divided according to length of meter test period, and separately for single-phase, ~~and polyphase and direct-current~~ meters. The summary shall show the number of "as found" tests found within each of the following accuracy classifications: not recording; 94.0% and under; 94.1% to 96.0%; 96.1% to 98.0%; 98.1% to 99.0%; 99.1% to 100.0%; 100.1% to 101.0%; 101.1% to 102.0%; 102.1% to 104.0%; 104.1% to 106.0%; and over 106.0%. The accuracy summary for the calendar year shall be submitted to the commission by April 1 of the following year, except that utilities using the variable interval plan (PSC 113.525) shall submit the accuracy summaries (for the test year ending September 30) by the following January 1. As found, tests of other units of metering equipment shall be summarized in a manner consistent with the method of testing employed by the utility. A record shall be kept of the number of complaint tests made each year. For the annual summary for variable interval plan tests, to show the range of test intervals for each group, the reporting utility shall include for each group the dates of the most recent and most distant periodic tests.

(18) Sec. PSC 113.24 is amended as follows:

PSC 113.24 Preservation of records. The following records shall be preserved and kept available for inspection by the commission for the periods indicated. The list is not to be taken as comprehending all types of utility records.

Description of record	Period to be retained
Maps showing the location and physical characteristics of existing plants---	Currently
Engineering records in connection with construction projects	Permanently
<u>if construction of project results wholly or in part-----</u>	<u>Until record is superseded or 6 years after plant is retired</u>
Production records:	
Station and system generation records	Permanently
All other records taken in the plant	6 years
Operating records:	
Load dispatcher data-----	6 years
Interruption records-----	6 years
Meter test-----	See PSC 113.23
Meter history records-----	Life of meter
Annual meter accuracy summary-----	16 years
Voltmeter records-----	See PSC 113.29
All other records of operation-----	6 years
Equipment record:	
Must be placed in mortality study before destroying-----	Life of equipment
Customers' records:	
Inspection of customers' premises---	6 years
Customers' complaint record-----	6 years
Meter reading sheets-----	* years
Billing record-----	* years
Customer deposits-----	6 years after refund
Filed rates and rules-----	Permanently

~~Note:--See-also-federal-power-commission, order No. 54, August 30, 1938, and public service commission orders in dockets 2-U-1089, June 3, 1937, and 2-U-1116, July 20, 1937, prescribing classification of accounts.~~

Note: See also "Regulations to Govern the Preservation of Records of Electric, Gas and Water Utilities" adopted by the commission in dockets 2-U-5005 and 2-U-5396, May 4, 1972, for more comprehensive listing of retention periods of specific records.

\*Where machine billing is used and meter readings recorded on tabulating cards the register sheets may be considered the "meter reading sheets" and the "billing records." "Meter reading sheets" and "billing records" or the "register sheets" shall be kept 6 years or until they are no longer needed to adjust bills. This means that the records must be kept 6 years or from the date of one meter test to the next whichever is longer.

(19) Ch. PSC 113, Part V (Title) is amended to read:

VOLTAGE, CURRENT, AND FREQUENCY STANDARDS

(20) Sec. PSC 113.25 is repealed and recreated to read:

PSC 113.25 Standard and maintenance of voltage. Each utility shall adopt standard nominal service voltages for each of the several areas into which the distribution system or systems may be divided, and shall file with the commission a statement of the standard voltages adopted. The voltage maintained at the point of attachment of customer-owned service to the company-owned conductors, shall be reasonably constant within the following limits:

(1) For all retail service, except power service, rendered in urban communities in which the utility serves 100 or more separate customers, the variation of voltage shall be no more than 5% above or below the standard voltage at any time.

(2) For all retail service except power service rendered in rural areas or in urban communities in which the utility serves less than 100 customers, the variation of voltages shall be no more than 6% above or below the standard voltage at any time.

(3) For retail power service furnished customers having demands of 500 kilowatts or less the voltage variation shall not exceed 5% above nor 10% below the standard voltage; and for retail power service furnished customers having demands of more than 500 kilowatts the voltage variation shall not exceed 10% above nor 10% below the standard voltage. The term "retail power service" as used herein means service furnished principally for electromotive or industrial purposes and may include service for lighting incidental thereto, as defined in the utility's rates and rules.

(4) For retail combined lighting and power service, the voltage variation shall not exceed the limits provided under sections (1) and (2) herein. For rates applicable to combined lighting and power service each utility shall file rules and regulations setting forth the utilization equipment permitted under the rates.

(5) For service rendered to public utilities and others for resale the reference voltage level shall be as mutually agreed upon by the parties concerned and the variations in voltage shall, except with respect to interchange contracts, be no more than 10% above or below the reference voltage level.

(6) The variation of voltage referred to in (1) to (5), inclusive, shall be a gradual change in voltage as a result of normal changes in load and incremental

- (21) Sec. PSC 113.26 is renumbered sec. PSC 113.28. Former Sec. PSC 113.28 is renumbered PSC 113.26 and renumbered Sec. 113.26 is amended to read:

PSC 113.26 ~~Variation of voltage, current and frequency.~~ Unusual variations of voltage. (1) Variations of ~~voltage, current and frequency~~ in excess of those specified in section PSC 113.25, ~~113.26 and 113.27~~ caused by service interruptions, the action of the elements, temporary separation of parts of the system from the main system, infrequent and unavoidable fluctuations of short duration, or other causes beyond the control of the utility shall not be considered a violation of these rules.

(2) Where the utility's distribution facilities supplying such customers are reasonably adequate and of sufficient capacity to carry the actual loads normally imposed, the utility may require that equipment on customers' premises shall be such that starting and operating characteristics will not cause an instantaneous voltage drop of more than 4% of the standard voltage or cause objectionable flicker to other customers' service.

(3) Service shall be considered inadequate when there are frequent or continuous sudden changes in voltage exceeding 2% where the rate of change exceeds 3 volts per second. ~~during hours when artificial lighting is essential as specified in section PSC 113.25(1), (2), and (3).~~

- (22) Sec. PSC 113.26(4) is created to read:

(4) When procedures for voltage reduction during emergency operating conditions have been filed and accepted or approved by the commission, variations of voltage in excess of those specified in PSC 113.25, resulting from implementation of the specified procedures, shall not be considered a violation of the rules.

- (23) Sec. PSC 113.27 is repealed and recreated to read:

PSC 113.27 Harmonics of 60 Hz voltage wave. (1) Utilities shall make all reasonable efforts to minimize the effects of higher harmonics. When the source of objectionable harmonics is determined to be equipment owned by a specific customer, the customer shall be so advised and informed of his responsibility to correct the problem. (See PSC 113.015.)

(24) Sec. PSC 113.29 is amended as follows:

PSC 113.29 Voltmeters and voltage records.

(1) Each utility shall provide itself with one or more portable indicating voltmeters, and each utility serving more than 150 customers shall also have one or more recording (curve-drawing) voltmeters. Each utility shall make a sufficient number of voltage measurements to indicate the character of the service furnished to its customers and to satisfy the commission upon request of its compliance with the voltage requirements. ~~Utilities required to have curve-drawing voltmeters shall keep at least one instrument in continuous service at the plant, office, or on customers' premises.~~ All voltmeter records, unless replaced by more recent records, shall be available for inspection by the commission for a period of 6 years.

(2) Each recording voltmeter shall be checked with an indicating voltmeter when it is placed in operation and when it is removed, or periodically if the instrument is in a permanent location. Notations on each chart shall indicate when the registration began (time and date) and when the chart was removed, as well as indicate the point where the voltage was taken, and the results of check with indicating voltmeter.

(25) Ch. PSC 113, Part VI (Title) is amended as follows:

GENERAL REQUIREMENTS-AS-TO METERING REQUIREMENTS

(26) Sec. PSC 113.31 is amended to read:

PSC 113.31 Measuring customer service. All energy sold to customers shall be measured by commercially acceptable measuring devices owned and maintained by the utility, except where it is impracticable to meter loads, such as ~~multiple-street-lighting, temporary or special installations, in which case the consumption may be calculated,~~ certain highway or area lighting, which may be billed at a flat rate based on lamp size and calculated consumption, or temporary or special installations in which case the consumptions may be calculated.

All other electrical quantities which the rates or utility's rules indicate are to be metered shall be metered by commercially acceptable instruments owned and maintained by the utility.

(27) Sec. PSC 113.32 is amended as follows:

PSC 113.32 ~~one-point-of-metering.~~ One-point metering. Every reasonable effort shall be made to measure at one point all the electrical quantities necessary for billing a customer under a given rate.



(28) Sec. PSC 113.35 is amended to read:

PSC 113.35 Multipliers and test constants. (1) Meters which are not direct reading shall have the multiplier plainly marked on the dial of the instrument or otherwise suitably marked and all charts taken from recording meters shall be marked with the date of the record, the meter number, customer, and chart multiplier.

(2) The register ratio shall be marked on all meter registers. ~~Meters-already-in-service-may-be-so-marked-when-they-are-tested.~~

(3) The watthour constant for the meter itself shall be placed on each ~~all~~ watthour meters. ~~Meters-already-in-service-may-be-so-marked-when-they-come-to-the-meter-shop.~~

(29) Sec. PSC 113.37(1) is amended as follows:

PSC 113.37 Sealing meters and service entrance equipment. (1) Meters and metering equipment enclosures which if open would permit access to live parts from which energy could be used without proper measurement; and utility-owned devices and equipment located on a customer's property for the control of his load shall be sealed.

(30) Sec. PSC 113.38 is repealed and recreated to read:

PSC 113.38 Installation of metering equipment.

(1) The customer or his agent should confer with the utility as one of the first steps in planning an electrical installation. The watthour meter should be located where it will be readily accessible for reading, testing and repairs and where it will not be subjected to adverse operating conditions or cause inconveniences to the customer. Normally, the utility shall determine the location and type of metering equipment to be installed.

(2) The utility should have available for distribution to customers, architects, contractors and electricians copies of rules, specifications and requirements that may be in force relative to meter installations. Installations should conform to such specifications and to applicable codes and safety requirements.

(3) Whether installed indoors or outdoors, meters should not be located where they will be subject to vibration or mechanical damage and should be mounted without tilt.

(4) Meters and associated equipment used on outdoor installations shall be designed specifically for such use or shall be suitably housed for outdoor service. Meters installed outdoors should not be located where they may be damaged, such as on buildings where unguarded meters will extend into alleys, walkways or driveways.

(5) Meters installed outdoors should not be more than 6 feet or less than 4 feet above final ground level (measured from the center of the meter cover) except in the case of meters on pedestals or padmounted transformers where they shall be placed as high as practicable, and meters on underground services which may, when practicable, be placed as low as  $2\frac{1}{2}$  feet above final ground level (measured from the center of the meter cover). On individual installations indoors the meter should be not more than 6 feet or less than 4 feet above floor level (measured from the center of the meter cover). On group installations of meters indoors no meter should be more than 6 feet or less than 2 feet above floor level (measured from the meter cover). When a number of meters are placed on the same meter panel the distance between centers should be not less than  $8\frac{1}{2}$  inches vertically or  $7\frac{1}{2}$  inches horizontally. For meters installed both indoors and outdoors there should be a minimum of 3 feet of unobstructed space in front of the meter from the surface on which it is mounted.

(6) When there is more than one meter at a location, each shall be so tagged or marked as to indicate the circuit metered. Where similar types of meters record different quantities (for example, kilowatt-hours and reactive power) the meters shall be tagged to indicate what they are recording.

(7) Test facilities shall be placed in enclosures of sufficient size and of such construction as to make it possible for meter testers to perform the tests required by these rules with safety.

(31) Sec. PSC 113.39 is repealed and recreated to read:

PSC 113.39 Rental charge for metering equipment.  
The utility may charge a rental for equipment installed to furnish additional metering information to a customer for his use or because of governmental requirements.

(32) Ch. PSC 113, Part VII (Title) is repealed and recreated to read:

#### ACCURACY OF METERS AND AUXILIARY DEVICES

(33) Sec. PSC 113.40(1)(c) is amended as follows:

(c) If they are designed for use on alternating current circuits, be accurate to within plus or minus 1.0% at two unity power factor loads, one equal to approximately 10% and the other approximately 100% (plus or minus 10%) of the reference test current; and shall register correctly within 2.0% plus or minus at a power factor of approximately 50% lagging and at a load between 75% and 100% of the reference test current of the meter. For self-contained meters the reference test current shall be the ampere or test ampere rating of the meter, whichever is shown on the name-plate. For meters used with current transformers the reference test current shall be the test-ampere rating of the meter or the secondary rating of the current transformers.

(34) Sec. PSC 113.40(1)(d) is repealed.

(35) Sec. PSC 113.40(3) is amended to read:

(3) Meters used with instrument transformers shall be adjusted, if necessary, so that the over-all accuracy of the metering installation will meet the requirements of this rule.

(36) ~~Sec. PSC 113.41(2) is renumbered 113.41(3). Secs. PSC 113.41(2) and (4) are created to read:~~

(2) and (3)

(2) The overall accuracy of demand metering installations utilizing pulse-initiator and pulse-recorder equipment shall be acceptable when the monthly kilowatt-hours calculated from the pulse count do not differ from the corresponding kilowatt-hour meter registrations by more than the kilowatt-hour constant of the meter, or 2%, whichever is greater. The timing element error shall not be more than plus or minus 4 minutes per day.

(3) When a timing element also serves to keep a record of the time of day at which the demand occurs, it shall be corrected if it is found to be in error by more than plus or minus 2 4 minutes per day.

(37) Sec. PSC 113.42(1)(b) is repealed and recreated as follows:

(b) Under usual operating conditions be 0.3% accuracy-class units and otherwise have characteristics such that the combined inaccuracies of all transformers supplying one or more meters in a given installation will not exceed the following:

100% Power Factor

50% Power Factor

10% Current      100% Current  
0.6%            0.3%

100% Current  
1%

(38) Sec. PSC 113.42(2)(c) is amended to read:

(c) The results of tests of instrument transformers shall be kept on record and available for use when transformers are installed. For other than 0.3% accuracy class instrument transformers, the results of the most recent test for each instrument transformer shall be entered on or attached to the test card form for each test of the associated meter prior to the test of that meter.

(39) Sec. PSC 113.48 is renumbered sec. 113.435, and renumbered sec. 113.435(2) is amended as follows:

(2) If a single-phase ~~or direct-current~~ metering installation is used on a varying load, the average error shall be the weighted algebraic average of the error at light load and the error at heavy load, the latter being given a weighting of 4 times the former.

(40) Ch. PSC 113, Part VIII (Title) is created between secs. PSC 113.435 and 113.44 to read:

TESTING EQUIPMENT, STANDARDS AND TEST METHODS

(41) Sec. PSC 113.44(2)(a) and (c) are amended as follows:

(a) One or more portable ~~rotating-standards~~ standard watthour meters of capacity and voltage range adequate to test all watthour meters used by the utility.

(c) One or more secondary standards to check each of the various types of ~~rotating-standards~~ portable standard watthour meters used for testing watthour meters. Each secondary standard shall consist of either an approved ~~rotating-standard~~ portable standard watthour meter kept permanently at one point and not used for field work, or not less than three approved watthour meters connected with current coils in series and voltage coils in parallel and kept running by connecting a 10-watt load. These meters must be well compensated for both classes of temperature errors, practically free from errors due to ordinary voltage variations, and free from erratic registration due to any cause.

(42) Sec. PSC 113.45 (Title), (4)(a), and (4)(b) are amended as follows:

(Title): PSC 113.45 Accuracy and calibration of test standards.

(4)(a) All working ~~rotating-standards~~ portable standard watthour meters when regularly used shall be compared with a secondary standard ~~at least once a week if they are of the commutator type and~~ at least once in every 2 weeks, ~~if of and if the induction type.--~~ Working ~~rotating-standards~~

infrequently used shall be compared with a secondary standard before they are used.

(b) Working ~~retating-standards~~ portable standard watthour meters shall be calibrated annually (see Wis. Adm. Code section PSC ~~113.49~~ 113.46 (1) and (2)) and shall be adjusted, if necessary, so that their accuracy will be within 99.7% and 100.3% at 100% power factor and within 99.5% and 100.5% at 50% lagging power factor at all voltages and loads at which the standard may be used. A history and calibration record shall be kept for each working ~~retating-standard-~~ portable standard watthour meter.

- (43) Secs. PSC 113.46 and 113.465 are repealed. Sec. PSC 113.46 is recreated to read:

PSC 113.46 Check of standards by commission.

(1) Each utility shall submit to the Electrical Standards Laboratory at the University of Wisconsin once each year, one of each type of portable standard watthour meter (60 hertz or 25 hertz) and once each 2 years one of each type of portable indicating voltmeter, ammeter, wattmeter, and other test instruments.

(2) Each utility which normally checks its own working portable standard watthour meters or instruments against primary or secondary standards shall calibrate these standards or instruments before they are submitted and attach to them a record of such calibration. In lieu of such calibrations the commission may require an alternative procedure for intercomparing the primary or secondary standards of the utility with standards maintained by the Electrical Standards Laboratory at the University of Wisconsin.

(Note: Previously sec. 113.49, with changes)

- (44) Sec. PSC 113.47 is renumbered 113.471 and renumbered sec. 113.471 (intro) and 3(a) are amended to read:  
(intro) Methods of test-ing watthour meters.

3(a) Single-phase test with the potential circuits connected in parallel and all current circuits connected in series. Three-stator, 4-wire delta meters must have correct values of current and potential applied to the differently rated circuits. The normal test loads apply. (See Wis.-Adm.-Code section PSC 113.40(1)(c).)

(45) Sec. PSC 113.472 is created to read:

PSC 113.472 Methods of testing block-interval demand registers. (1) The actual demand interval shall be determined and a billing period reset performed to determine that the pointer or test dial pointer returns to zero.

(2) For required field tests the demand register shall be tested as mounted on the watthour meter. The test interval shall include one demand interval or less, however, the demand registered shall be at least 30% of full scale. The demand registered shall be compared with the corresponding demand determined from either the disc revolutions of the associated watthour meter or, where feasible, with the registration of the portable standard watthour meter properly corrected for this test.

(46) Sec. PSC 113.473 is created to read:

PSC 113.473 Methods of testing block-interval pulse-operated demand meters and pulse recorders.

(1) The test shall include a check of the electrical and mechanical operation of the demand register or pulse recorder, an inspection of the pulse initiator and a check to determine that the demand meter resets properly.

(2) A demand meter or pulse recorder, its associated pulse initiators, relays and circuitry may be considered to be operating properly when a kilowatthour check indicates that the demand meter kilowatthours are within the required accuracy limits of the watthour meter kilowatthours. At least 20 pulses shall be transmitted from each pulse initiator during the test and it shall be determined that every pulse is received (recorded). The kilowatthour value of a pulse from each pulse initiator should be verified. In the case of pulse recorders, the incoming pulses may be checked against the counters on the pulse recorders, where available, or against visual or audible test equipment. When warranted, a test tape may be installed and the reading from the tape compared with the number of incoming pulses.

(47) Ch. PSC 113, Part IX is created following sec. 113.473 to read:

PART IX  
TESTING OF METERING EQUIPMENT

(48) Sec. PSC 113.50 is created to read:

PSC 113.50 Testing of metering installations-general requirements. (1) The test of any unit of metering equipment shall consist of a comparison of its accuracy with a standard of known accuracy by a qualified person. Units not properly connected or not meeting the accuracy or other requirements

of PSC 113.40, 113.41, and 113.42 at the time of test shall be reconnected and/or rebuilt to meet such requirements and adjusted to within the required accuracy and as close to 100% accurate as practicable or their use discontinued.

(2) Each unit of metering equipment shall be inspected for mechanical and electrical faults whenever the accuracy of the device is checked.

(3) Each meter tested shall have the register and the internal connections checked before the meter is first placed in service and whenever the meter is repaired.

(4) Each meter shall have the connections to the customer's circuits, the disc rotation and any multiplier checked when the meter is installed or removed or an instrument transformer is changed.

(5) Single phase meters shall be verified for accuracy at 50% power factor before first being used for measuring customer's service either by a test of each meter or by a sample test plan approved under PSC 113.51(1)(a) and each polyphase meter shall be tested at 50% power factor whenever tested.

(6) The connections, phase sequence and multiplier of polyphase transformer-rated metering installations shall be checked for error by qualified personnel within 60 days after the meter is installed.

(7) Special control devices, switches, etc., for time-of-use service shall be checked for proper operation whenever the associated meter is tested.

(49) Sec. PSC 113.51 is created to read:

PSC 113.51 Testing of self-contained single-phase meters and 3-wire network meters. (1)

These meters together with associated equipment such as demand devices, control devices, etc. shall be tested for accuracy at unity power factor at the point where they are installed or at a central testing point or in a mobile testing laboratory:

(a) Within a period of 12 months before to 60 days after they are placed in service.

(Exception: For new meters given a prior test by the manufacturer, a sample test program approved by the commission may be substituted for this requirement.)

(b) When they are suspected of being inaccurate or damaged.

(c) When the accuracy is questioned by a customer. (See PSC 113.57)

(d) Before use when they have been inactive for more than one year.

(e) When they are removed from service.

(f) Within a period of 6 months before to 6 months after 8 years of service for non-surge-proof and 12 years for surge-proof meters or in accordance with the plan outlined in Wis. Adm. Code section PSC 113.515.

(Exception: Lagged-demand meters shall be tested every 8 years.)

(50) Sec. PSC 113.515 is created to read:

PSC 113.515 Variable interval testing plan for self-contained meters. (1) The variable interval plan described below may be used for testing self-contained, single-phase and 3-wire network meters without demand registers or pulsing devices instead of the periodic test periods in section PSC 113.51, if the utility is authorized to do so by the commission.

(a) The meters shall be divided into homogeneous groups as approved by the commission, such as by manufacturers' types, and may be further subdivided in accordance with location or other factors which may be disclosed by test records to have an effect on the percentage registration of the meter.

(b) The meter accuracy for each of the groups shall be based on the results of tests of meters longest in service without test made during a 12-month period. The meter accuracy shall be the weighted average of the full and light load test with the full test being given a weighting of 4 and the light load test a weighting of 1.

(c) Each group of meters is to be considered separately in determining the number of meters to be tested in any period. The percentage, P, of meters in each group to be tested annually shall be based on the number of meters which were found during the previous year's in service tests to have a percentage registration of more than 102% or less than 98%.

The maximum value of P shall be 25% and the minimum value shall be not less than:

5% for a group of 2,000 or more meters. (Exception: The interval between tests shall not exceed 16 years, 6 months.)

100 meters or 10%, whichever is less, for a group of fewer than 2,000 meters.



The values of P between the maximum and minimum shall be determined from the formula:

$$P=6.25 \left[ \frac{100 (F+S)}{T} - 1 \right]$$

Where T=total number of meters tested in the group during the preceding year.

F=number of meters in this group which registered more than 102%.

S=number of meters in this group which registered less than 98%.

(d) Meter tests scheduled for the current year in each group shall consist of meters longest in service without test.

(e) Only scheduled periodic and scheduled retirement tests are to be considered when applying the formula.

(Note: Previously sec. 113.465, with changes.)

(51) Sec. PSC 113.52 is created to read:

PSC 113.52 Testing of self-contained poly-phase meters. (1) These meters together with associated equipment such as demand equipment, control devices, etc., shall be tested on the customer's premise (except (a), (d) and (e) below) for accuracy at unity and 50% power factor: (Exception: Lagged-demand meters and socket-type self-contained polyphase meters may be tested at a central testing point or in mobile testing laboratory.)

(a) Before being placed in service.

(b) When they are suspected of being inaccurate or damaged.

(c) When the accuracy is questioned by a customer. (See PSC 113.57)

(d) Before use when they have been inactive for more than 1 year.

(e) Within 60 days after they are removed from service.

(f) Within a period of 6 months before or 6 months after 8 years of service for non-surge-proof and 12 years for surge-proof meters. (Exception: Thermal and mechanical lagged-demand meters shall be tested every 8 years.)

(52) Sec. PSC 113.53 is created to read:

PSC 113.53 Testing of meters used with instrument transformers on single-phase service. (1) These meters together with associated equipment such as demand equipment, control devices, etc., shall be tested on the customer's premises (except (a), (d) and (e) below) for accuracy at unity power factor:

(Exception: Lagged-demand meters may be tested at a central testing point or in a mobile testing laboratory.)

(a) Before being placed in service.

(b) When they are suspected of being inaccurate or damaged.

(c) When the accuracy is questioned by a customer. (See PSC 113.57.)

(d) Before use when they have been inactive for more than 1 year.

(e) When they are removed from service.

(f) Within a period of 6 months before or 6 months after 8 years of service for non-surge-proof and 12 years for surge-proof meters.

(Exception: Lagged-demand meters shall be tested every 8 years.)

(53) Sec. PSC 113.54 is created to read:

PSC 113.54 Testing of polyphase meters used with instrument transformers. (1) These meters together with associated equipment such as demand equipment, pulsing devices, phase-shifting transformers, control devices, etc., shall be tested on the customer's premises (except for (a), (d) and (e) below) for accuracy at unity and 50% power factor:

(Exception: Lagged-demand meters may be tested at a central testing point or in a mobile testing laboratory.)

(a) Before being placed in service.

(b) When they are suspected of being inaccurate or damaged.

(c) When the accuracy is questioned by a customer. (See PSC 113.57.)

(d) Before use when they have been inactive for more than 1 year.

(e) When they are removed from service.

(f) Within a period of 2 months before or 2 months after 2 years of service for both non-surge-proof and surge-proof meters.

(54) Sec. PSC 113.55 is created to read:

PSC 113.55 Testing of metering installations utilizing pulse devices. (1) Metering installations utilizing pulse initiators and pulse recorders shall be checked for accuracy each billing period by comparing the recorded pulse count against the registration of the corresponding meter. When the results are not in agreement within the accuracy limits of PSC 113.41(2) the pulse devices shall be promptly tested and adjusted to required accuracy or replaced.

(2) Pulse devices shall be tested before use and as part of the complete metering installation whenever the associated watt-hour meter is tested.

(55) Sec. PSC 113.555 is created to read:

PSC 113.555 Testing of metering installations for time-of-use rates. (1) Specialized metering installations for service furnished under time-of-use rates shall be tested according to procedures as filed with and accepted by the commission.

(2) Each utility shall file its suggested test interval(s) and procedures for each type of specialized metering installation within 12 months after being placed in normal service. This does not apply to test or trial installations used for revenue metering for which the test or trial period does not exceed 24 months.

(56) Sec. PSC 113.56 is created to read:

PSC 113.56 Testing of instrument transformers.

(1) No instrument transformer shall be placed in service, or allowed to remain in service, if it shows evidence of physical damage, discolored terminals due to overload, change in texture or resiliency of insulation, or arc tracking on the insulation or bushings.

(2) Voltage-withstand tests. Instrument transformers of all utilities shall be tested for voltage withstand by the manufacturer, the utility, or a laboratory approved for such test by the commission before being placed in service. (The University of Wisconsin Electrical Standards Laboratory is not equipped to perform these voltage-withstand tests.) In addition, each instrument transformer that has been removed from service shall be tested for voltage withstand prior to reinstallation if the reason for removal or physical appearance, gives cause to doubt its reliability. The utility shall maintain a record of all such tests.

(3) Instrument transformers of class A utilities shall be tested at the utility meter shop or the University of Wisconsin Electrical Standards Laboratory for accuracy (ratio correction factor and phase angle):

(a) Before being initially placed in service.

(b) When removed from service.

(c) When there is evidence from outward appearance or performance to suspect inaccuracy.

(4) Instrument transformers of other than class A utilities shall be tested for accuracy (ratio correction factor and phase angle):

(a) Before being placed in service. This test may be performed by the manufacturer, the utility, or the University of Wisconsin Electrical Standards Laboratory.

(b) When there is evidence from outward appearance or performance to suspect inaccuracy. This test may be performed by the University of Wisconsin Electrical Standards Laboratory.

(5) Instrument transformers in service shall be given an approved check (such as the variable burden method in the case of current transformers or a field check of the secondary voltage with a good quality voltmeter in the case of voltage transformers) made in conjunction with each field test of the associated watthour meter. When such check provides evidence that the instrument transformer may be inaccurate, that instrument transformer shall be tested for accuracy.

(57) Sec. PSC 113.57 is created to read:

PSC 113.57 Customer request test. Each utility shall promptly make a test of any metering installation upon request of the customer if 12 months or more have elapsed since the last request test of the meter in the same location. The test shall consist of a test for accuracy and a check of the register and meter connections on the customer's premises. At the customer's request and expense the installation shall be checked for accidental grounds. The customer shall be furnished a report of the result of the test. (See PSC 113.17 for adjustment of bills for inaccurate meters.)

(58) Sec. PSC 113.575 is created to read:

PSC 113.575 Commission referee test. (1) Upon application and payment of the following fee to the commission by any customer, the commission will make a test covering the accuracy of the installation, check of connections, and any other check or test which appears desirable. The utility shall reimburse the customer for the fee if the watthour or varhour meter creeps or if the error in registration is more than 2% fast (average error as defined in section PSC 113.435), if the demand meter tested is more than 1.5% fast in excess of the tolerance allowed in section PSC 113.41, or if improper connections or auxiliary equipment results in over-registration greater than stated above. The fees for making such tests shall be as follows:

Single-phase self-contained watthour meter*-----	\$ 5
Single-phase transformer-rated watthour meter*-----	\$10
Polyphase self-contained watthour meter*-----	\$20
Polyphase transformer-rated watthour or varhour meter*-----	\$50
Demand register-----	\$10
Instrument transformer field check, for each transformer checked-----	\$ 5
Other metering equipment-----	**

\*Exclusive of any demand register

\*\*At cost of test

(2) In the case of a test involving a metering installation for residential or farm time-of-use service, the test fee for metering equipment other than instrument transformers may be waived by the Commission for requests made within 5 years from the effective date of this revised rule.

- (59) Ch. PSC 113 Part X (Title) is created following sec. 113.575 to read:

AUXILIARY METERING DEVICES

- (60) Sec. PSC 113.60 is created to read:

PSC 113.60 Phase-shifting transformers. (1) For phase-shifting transformers in service, all terminal connections shall be in such condition as to provide good electrical contact and the terminal designations shall be clearly visible. Where there is evidence of physical damage or evidence of thermal overload the unit shall be replaced.

(2) Phase-shifting transformers shall be tested on the same schedule and at the same time as the meters with which they are associated. The test shall consist of single-phase test to be preformed as follows: With the approximate rated voltage applied to the input terminals and no burdens connected to the tap terminals all tap voltages, converted to percentage of input voltage, shall agree within plus or minus 2.0% of the theoretical values given in the manufacturer's published data.

(3) In addition, all units shall be tested before use and when returned to the utility's meter laboratory. For these tests the output-voltage values in terms of percentage of input voltage and under the conditions of

(2) immediately above shall agree within plus or minus 1.0%.

- (61) Sec. PSC 113.61 is created to read:

PSC 113.61 Transformer-loss compensators. (1) For transformer-loss compensators in service all terminal connections shall be in such condition as to provide good electrical contact and the terminal designations shall be clearly visible. Where there is evidence of physical damage to the component parts, their adjustments, or to the internal wiring or evidence of thermal overload on the insulation, resistors, terminals, etc., the affected parts shall be replaced or the entire transformer-loss compensator replaced.

(2) Transformer-loss compensators shall be tested on the same schedule and at the same time as the meters with which they are associated.

(3) The tests shall be made at the normal service test points of the meter. Performance deviations from desired performance shall not exceed plus or minus 0.3%.