Chapter PSC 113

SERVICE RULES FOR ELECTRIC UTILITIES

PSC 113.01 Application of rules. (1) All public utilities, whether privately or municipally owned or operated, in respect to the supply of electric energy and provision of electric service in this state, shall comply with and conform to rules and regulations set forth in this order except insofar as exception may be made by order of the commission as hereinafter mentioned.

(2) Nothing in this chapter of the Wisconsin administrative code shall preclude special and individual consideration being given to exceptional or unusual situations and upon due investigation of the facts and circumstances therein involved, the adoption of requirements as to individual utilities or services which shall be lesser, greater, other, or different than those provided in said rules and regulations.

History: 1–2–56; am. (2), Register, October, 1965, No. 118, eff. 11–1–65.

PART I

MISCELLANEOUS SERVICE REQUIREMENTS

PSC 113.015 General requirement. Every utility shall furnish reasonably adequate service and facilities at the rates filed with the commission and subject to these rules and the rules of the utility[1] applicable thereto and not otherwise. The energy shall be generated, transmitted, converted, and distributed by the utility, and utilized, whether by the utility or the customer, in such manner as to obviate so far as reasonably practicable undesirable effects upon the operation of standard services or equipment of the utility, its customers, or other utilities or agencies.

PSC 113.02 Refusal of service. (2) Service may be denied to any customer for failure to comply with applicable requirements of these rules, or of the utility's rules, or of municipal ordinances, or with section 167.16, Wis. Stats.; or if the customer proposes to use a device that is not so designed that interference with communication and signal services is reasonably minimized.

(3) A utility is not required to furnish service under conditions requiring operation in parallel with generating equipment connected to the customer's system if such operation is hazardous or may interfere with its own operations or service to other customers or with service furnished by others. The utility may specify requirements as to connection and operation as a condition of rendering service under such circumstances.

(4) The following shall not constitute sufficient cause for refusal of service to a present or prospective customer:

(a) Delinquency in payment for service by a previous occupant of the premises to be served.

(b) Failure to pay for merchandise purchased from the utility.

(c) Failure to pay for a different type or class of public utility service.

(d) Failure to pay the bill of another customer as guarantor thereof.

(e) Failure to pay a charge billed pursuant to section PSC 113.17 (4) because of an inaccurate meter.

(f) Failure to pay an estimated bill unless the customer upon request refuses to permit the reading of the meter during reasonable hours.

(g) Failure to pay a bill to correct previous underbilling due to misapplication of rates.

(h) Violation of the utility's rules pertaining to operation of nonstandard equipment which interferes with the service to others, or other services such as communication services, unless the customer has first been notified and been afforded reasonable opportunity to comply with said rules; provided, however, that where a dangerous condition exists on customer's premises, service may be discontinued without notice.

History: 1–2–56; r. (1), and recr. to be PSC 113.13, Register, August, 1962, No. 80, eff. 9–1–62.

[1] As used in these rules the terms "rules of the utility" or "utility's rules" mean the rules of the utility on file with the commission.

PSC 113.03 Inspection of structures and equipment. Each pole, post, tower, structure, conductor, or guy used for the support or attachment of electrical conductors or lamps owned or used by a utility shall be inspected with reasonable frequency and all major equipment shall be inspected periodically by the utility to determine its fitness for service and the necessity for replacement or repair.

PSC 113.04 Servicing utilization control equipment. (1) Utilities shall service and maintain any equipment they use on customers' premises and shall adjust thermostats, clocks, relays, or time switches, if such devices must be so adjusted to provide service in accordance with the rate provisions.

(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 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.

(3) Control devices other than time switches used by the utility to control loads shall be checked periodically.

PSC 113.05 Relocation of poles. (1) When a utility is required by governmental authority or requested by customers to move poles, as, for example, from streets to alleys, the utility is not required to furnish new service entrance conductors, cable, conduit, or service equipment unless it makes a practice of supplying this equipment. It shall, however, run a service drop to the nearest point on each building served from the new location and remove the old service drop without expense to the customer.

(2) If the utility moves its poles of its own volition the utility shall supply new service entrance conductors, cable, conduit, interior wiring connection, and service equipment, and remove the old; or shall attach its system to the existing service entrance conductors without expense to the customer.

PSC 113.055 Protection of utility facilities. A public utility upon receipt of writen notice as required by section 66.047 (2), Wis. Stats., from the property owner or from a contractor of work which may affect its facilities used for serving the public:

(1) Shall 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, such as identifying in a suitable manner the location of any underground utility facilities which may be affected by the work.

(2) The utility shall take such action as is reasonably and legally 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, provided that 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.

(3) The utility may, in order to protect its interests, require that the owner or contractor perform certain work upon that part of the service piping or wiring on or being removed from the property upon which the excavating, building, or wrecking operations are being performed.

(4) This rule is not intended to affect the responsibility of the contractor or owner, or the liability or legal rights of any party.

History: Cr. Register, June, 1962, No. 78, eff. 7-1-62; am. intro. par., Register, October, 1965, No. 118, eff. 11-1-65.

PSC 113.057 Interference with public service structures. (1) No utility having any work upon, over, along, or under any public street or highway or upon, over, along, or under any private property shall interfere with, destroy, or disturb the structures of any other public service corporation or railroad encountered in the performance of such work so as to interrupt, impair, or affect the public service for which such structures may be used, without first reaching an agreement concerning the location and the nature of the proposed work.

(2) A utility shall exercise care when working in close proximity of existing facilities. When the facilities are underground and are to be exposed or possibly may be exposed, hand-digging shall be employed. In these cases, such support as may be reasonably necessary for protection of the facilities shall be provided in and near the construction area. When backfilling an excavation such procedures and materials will be employed to provide reliable support for existing underground facilities in and near the construction area.

(3) A utility shall, in the absence of working arrangements, give at least 3 days' written notice (not counting Saturdays, Sundays, and legal holidays) to all utilities or railroads and to those who may have facilities in and near the construction area which may be affected by the proposed work. The utility proposing to work shall obtain from the affected party the location of the existing facilities determined to be affected or to be in and near the construction area.

(4) A utility upon receiving a notice of proposed construction shall furnish in 3 days detailed information relative to location and type of facilities that are present in the proposed construction area. In those cases where the facilities are underground, they shall be marked physically in the field relative to location.

(5) 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. However, all reasonable precautions shall be taken to avoid or minimize damage or interference to the other facilities and notification shall be given as soon as possible to the utilities which have facilities in the construction area.

History: Cr. Register, October, 1965, No. 118, eff. 11-1-65.

PSC 113.06 Standard utilization equipment. (1) All utilities shall have available a tabulation showing the character and type of electric service supplied.

(2) Street lamp bulbs used or furnished by the utility 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.

PSC 113.07 Tamper-resistant equipment. Where electrical energy has been diverted or the utility's equipment for measuring the service 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.

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, Wis. Stats. (Section 98.25, Wis. Stats., was repealed by chapter 659, laws of 1961.)

PSC 113.08 Power-factor correction of gaseous tube lighting. When fluorescent, neon, zeon, or other hot or cold cathode types of gaseous tube lighting having similar power-factor characteristics are installed as the major lighting source, the customer shall furnish, install, and maintain at his own expense corrective apparatus designed to maintain at not less than 90% lagging the power-factor of individual lighting unit or the entire lighting installation.

History: 1-2-56; r. and recr., Register, October, 1965, No. 118, eff. 11-1-65.

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 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.

(2) If a utility changes its standard voltage it shall notify customers in advance and if customer equipment other than lamps must be changed, an adjustment as required in subsection (1) hereof shall be made. If tests of a representative sample of customers' meters indicate that meters have started to creep because of the voltage increase or if the tests of the representative sample show that meters average more than 0.5% fast, meters affected by the change in voltage shall be tested and adjusted.

PSC 113.10 Connection of motor-generator-type welders. The connection of motor-generator-type welders shall be governed by the utilities' rules covering the connection of motors.

PSC 113.101 Connection of other than motor-generator-type welders. (1) Each welder shall be provided with a name plate showing:

(a) Name of manufacturer.

(b) Manufacturer's type designation and serial number.

(c) Frequency.

(d) Primary volts.

(e) Maximum input (primary) amperes (at rated output amperes).

(f) Output volts at rated output amperes.

(g) Rated output amperes.

(h) Rated duty cycle or time rating.

(i) Temperature rise in degrees C.

(j) Open-circuit voltage.

(2) Each welder shall be provided with a proper disconnecting means, and shall be constructed, installed, and maintained in a manner which does not conflict with the requirements of the Wisconsin state electrical code.

(3) The consent of the utility shall be obtained and any changes in the customer's wiring and in the utility's facilities, necessary to permit welder operation under safe conditions and without interference to the service of other customers, shall be completed before any electrical welder is connected.

(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) 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) at other customers' service entrances on a reasonably adequate secondary.

(b) Commercial customers irrespective of location and customers residing in areas where service generally is supplied from individual distribution transformers.

1. 220–240 volt electric arc welders having a rated-maximum operating input current of not to exceed 37.5 amperes with an output-load voltage of 25 volts at an input of 230 volts, where the customer agrees to reduce operation of other electrical equipment to a minimum during periods the welder is in use, and agrees not to use the welder during lighting hours except in case of emergency.

2. Where the welder name plate does not give the rated primary current, the welder primary rated current shall be taken as two-thirds of the maximum final or stable short-circuit current obtainable.

3. The welder transformer used as a part of the welder shall be of the double-winding type, and the secondary shall be thoroughly insulated from the primary.

4. The welders shall not have a final or stable short-circuit current for any current setting exceeding 150% of the rated input current.

(6) Each utility may require that welders not permitted by subsection (5) above be served from a separately metered circuit under rates applicable to that arrangement, or may file an extra charge for serving such welders from the general service circuit, which charge shall be based on the excess of the primary input current of the welder over the allowable input welder current, according to location, permitted under subsection (5) above. The input current shall be taken as two-thirds of the maximum final or stable short-circuit current obtainable.

PART II

REQUIREMENTS AS TO RATE SCHEDULES AND RULES OF THE UTILITY

(See also section PSC 113.25)

PSC 113.11 Schedules to be filed with commission. The schedules of rates and rules to be filed with the commission by the utility shall be classified, designated, arranged, and submitted so as to conform to the requirements of current tariff or rate schedule circulars and special instructions which have been and may from time to time be issued by the commission. Provisions of the schedules shall be definite and so stated as to minimize ambiguity or the possibility of misinterpretation, and shall include, together with such other information as may be deemed pertinent, the following:

(1) All rates for service with indication for each rate of the type and voltage of service and the class of customers to which each rate applies. There shall also be shown any limitations on loads and type of equipment which may be connected, the prices per unit of service, and the number of units per billing period to which the prices apply, the period of billing, the minimum bill, method of measuring demands including method of calculating or estimating loads or minimums, and any special terms and conditions applicable. The discount for prompt payment or penalty for late payment, if any, and the period during which the net amount may be paid shall be specified.

(2) By municipalities, but without reference required to any particular part thereof, the voltage at which service will be supplied and the type of service (direct current or single- /or polyphase alternating current).

(3) Forms of standard contracts required of customers for the various types of service available.

(4) If service to other utilities, to electric cooperatives, or municipalities is furnished at a standard filed rate, either a copy of each

contract or the standard contract form together with a summary of the provisions of each signed contract. The summary shall show the principal provisions of the contract and shall include the name and address of the customer, the points where energy is delivered, rate, term, minimums, load conditions, voltage of delivery, and any special provisions such as rentals. Standard contracts for such sales as that of energy for resale, street lighting, municipal athletic-field lighting, and for water utilities may be filed in summary form as above outlined.

(5) Copies of special contracts for the purchase, sale, or interchange of energy.

(6) List of villages, cities, and unincorporated communities where urban rates are applicable, and towns in which service is furnished.

(7) The list of service areas and the rates shall be filed in such form as to facilitate ready determination of the rates available in each municipality and in such unincorporated communities as have service at urban rates. If the utility has various rural rates, the areas where the same are available shall be indicated.

(8) Definitions of classes of customers.

(9) Extension rules for extending service to new customers indicating what portion of the extension or cost thereof will be furnished by the utility; and if the rule is based on cost, the items of cost included.

(10) Type of construction required if in excess of the standards required by the Wisconsin state electrical code.

(11) Specification of such portion of service as the utility furnishes, owns, and maintains, such as service drop, service entrance cable or conductors, conduits, service entrance equipment, meter, and socket. Indication of the portions of interior wiring such as range or water-heater connection, furnished in whole or in part by the utility, and statement indicating final ownership and responsibility for maintaining equipment furnished by utility.

(12) Statement of the type of special construction commonly requested by customers which the utility allows to be connected, and terms upon which such construction will be permitted, with due provision for the avoidance of unjust discrimination as between customers who request special construction and those who do not. This applies, for example, to a case where a customer desires underground service in overhead territory.

(13) Rules with which prospective customers must comply as a condition of receiving service, and the terms of contracts required.

(14) Rules governing the establishment of credit by customers for payment of service bills.

(15) Rules governing the procedure followed in disconnecting and reconnecting service.

(16) Notice by customer required for having service discontinued.

(17) Rules covering temporary, emergency, auxiliary, and stand-by service.

(18) Rules covering the type of equipment which may or may not be connected, including rules such as those requiring demand-limiting devices or power-factor corrective equipment.

PSC 113.115 Forms to be filed. On or before May 1 of each year, all public utilities rendering electric service in Wisconsin who report to the Federal Power Commission on form 12–12A or form 12D shall supply a copy of such report to the Public Service Commission.

History: Cr. Register, March, 1963, No. 87, eff. 4–1–63.

PSC 113.12 Information available to customers. (1) There shall be kept on file in every station and office of the utility where payments are received copies of the rate schedules applicable in such locality. Copies of these rules and such rules of the utility as are applicable shall be kept on file in every general and local office of the utility. Reasonable notice shall be given customers as to where the foregoing information is available to them.

(2) (a) Where a customer is eligible to take service under any one or more of two or more rates, the company shall advise the customer in the selection of the rate or rates which result in the lowest cost of service, based on 12 months' service and on the information at hand.

(b) The selection of a rate or rates shall be reviewed every 12 months, whenever there is a change in rates, and whenever a request to do so is received from the customer. The customer shall be notified if any combination of services, change in voltage of delivery, or the installation of any equipment will result in a lower cost of service.

PSC 113.13 Deposit, guarantee, and disconnect rules. (1) DEPOSIT RULE. (a) If the credit of an applicant for service has not been established satisfactorily to the utility, he may be required to deposit a sum not exceeding the estimated gross bills for service for any 2 consecutive billing periods selected by the utility. The amount to be deposited may be a minimum of $5 for each class of service furnished. Deposits shall bear simple interest at the rate of 5% per annum payable from the date of the deposit to the date of refund or discontinuance of service whichever is earlier.

(b) In the case of domestic service, the deposit shall be refunded upon request of the customer after 12 consecutive months of prompt payment, and, without such request, shall be refunded voluntarily by the utility after 36 consecutive months of prompt payment. In no case, however, will a deposit be refunded if the customer's credit standing is not satisfactory to the utility.

(c) In the case of commercial or industrial service, the deposit may be refunded upon request of the customer after 36 consecutive months of prompt payment, if the customer's credit standing is satisfactory to the utility.

(d) If the rules of the utility permit a customer to pay the net rate after discount date 1 month in every 12 months, such payment shall be regarded as "prompt payment" in the application of the above rule.

(e) A new or additional deposit may be required upon reasonable written notice of the need for such a requirement in any case where a deposit has been refunded or is found to be inadequate to cover 2 months' bills as above provided for, or where a customer's credit standing is not satisfactory to the utility. The service of any customer who fails to comply with these requirements may be disconnected upon 5 days' written notice.

(2) GUARANTEE RULE. (a) The utility may accept, in lieu of a cash deposit, a contract signed by a guarantor satisfactory to the utility, whereby payment of a specified sum not exceeding the cash deposit requirement is guaranteed. The term of such contract shall be indeterminate, but shall automatically terminate when the customer gives notice to the utility of discontinuance of service at the location covered by the guarantee agreement or 6 months after discontinuance of service, or at the guarantor's request upon 30 days' written notice to the utility.

(b) Upon termination of a guarantee contract or whenever the utility deems same insufficient as to amount or surety, a cash deposit or a new or additional guarantee may be required upon reasonable written notice to the customer. The service of any customer who fails to comply with these requirements may be disconnected upon 5 days' written notice.

(c) The guarantor shall receive copies of all disconnect notices sent to the customer whose account he has guaranteed unless the guarantor waives such notice in writing.

(3) SCOPE OF DEPOSIT AND GUARANTEE RULES. (a) Where an applicant or customer is unable to furnish either the required cash deposit or a satisfactory guarantor, or where the customer's business is of a hazardous or temporary nature, the utility may at its option bill such applicant or customer on other than a monthly basis with a corresponding adjustment in the deposit or guarantee requirement and disconnect procedure.

(b) Subsections (1), (2), and (3) (a) are not applicable to deposits or guarantees made in connection with the financing of extensions or other equipment.

(4) DISCONNECT RULE. (a) Service may be disconnected if a customer's current bill for service as defined in the utility's filed rules is not paid within a reasonable period set forth in said rules.

(b) The utility may at its option continue service beyond the period provided under its filed disconnect rules under the following conditions: If the utility has a deposit or guarantee on the account, such deposit or guarantee shall be considered as applying against the bill which first becomes delinquent. If the utility has no deposit or guarantee on the account, or if the delinquent bill exceeds the deposit or guarantee, service may not be discontinued or refused for nonpayment of a bill which is delinquent for a period longer than that permitted under the filed disconnect rule.

(c) Subsection (4) (b), above, shall apply in all cases unless the customer is willing to enter into a special agreement with the company, a written memorandum of which shall be made by the utility, providing for a specified extension of time and/or an extension of a specified amount of credit, and providing further for the disconnection of such customer upon failure to comply with the terms of such extension agreement.

Note: Some utilities have rules or practices that are more liberal to customers in some particulars than the rules enumerated above. It is not the intention of the Commission to require the abandonment of these practices, except that we believe a standardization of interest on customers' prompt payment deposits will avoid confusion and misunderstanding. With this exception, a utility of the classes here involved may establish uniform, nondiscriminatory rules and practices more favorable to its customers than those herein established. The purpose herein is rather to set forth a reasonable basis for standardizing these rules.

(5) APPLICATION. All electric and/or gas utilities, whether privately or municipally owned or operated, shall file with the commission deposit, guarantee, and disconnect rules or procedure in accordance with this section, except that an individual utility, upon proper application and a showing of good cause, may, upon written approval by the commission, adopt rules giving consideration to specific unusual circumstances.

History: 1–2–56; r. and recr. Register, August, 1962, No. 80, eff. 9–1–62.

PSC 113.14 Limiting connected load. If the utility maintains a rate based on connected load, provision shall be made in its rules whereby the customer may arrange his load or wiring in such manner as is reasonably acceptable to the utility, whether by the use of double-throw switches or such other devices as may be approved by the utility, so that only a portion of the load may be served at one time and whereby, in such cases, the connected load to be used for the computation of charges shall be the largest load which can be served at any one time.

PART III

CHARGES AND BILLING

PSC 113.15 Meter readings and billing periods. Readings of all meters used for determining charges to customers shall be scheduled monthly, bimonthly, quarterly, or semiannually. An effort shall be made to read meters on corresponding days of each meter-reading period. The meter-reading date may be advanced or postponed not more than 5 days without adjustment of the billing for the period. Bills for service shall be rendered within 40 days from the reading of the meter except as may be otherwise specifically authorized by the commission. The utility may permit the customer to supply the meter readings on a form supplied by the utility, provided a utility representative reads the meter at least once each 6 months and when there is a change of customer.

PSC 113.16 Billing. (1) Each bill, including the customer's receipt, shall show the present and last preceding meter readings, the date of the present reading, the number of units consumed, the class of service if other than residential, the net and gross amount of the bill, the date after which the gross amount must be paid, and the rate schedule under which the bill is computed. In lieu of including the rate schedule on the bill the utility may, whenever a rate change becomes effective and at least twice a year supply each customer with the schedule of rates at which the bills are computed and any other rates that might be applicable. Bills rendered at rates requiring the measurement of a number of different factors shall show all data necessary for the customer to check the computation of the bill. Minimum and estimated bills shall be distinctly marked as such.

(2) (a) If the billing period is longer or shorter than allowed in section PSC 113.15, the bill shall be prorated on a daily basis unless other provision is made in the utility's filed rules.

(b) If the utility reads the meters at the end of each billing period, the utility may, or if requested by the customer shall, leave meter reading forms when access to meters cannot be gained. If no form

is left or the form is not returned in time for the billing operation, a minimum or estimated bill may be rendered. In cases of emergency, the utility may render minimum or estimated (average) bills without reading meters or supplying meter-reading forms to customers. Only in unusual cases or when approval is obtained from the customer shall more than 3 consecutive estimated bills be rendered.

(c) If the utility schedules the reading of meters less frequently than once each billing period, the utility unless otherwise requested by the customer, shall supply meter-reading forms for the periods when the meter is not scheduled to be read. If the customer fails to return the meter-reading form or has informed the utility he does not wish to supply a reading, a minimum or estimated bill may be rendered.

(d) If an estimated bill appears to be abnormal when a subsequent reading is obtained, the bill for the entire period shall be computed at a rate which contemplates the use of service during the entire period and the estimated bill shall be deducted. If there is reasonable evidence that the use occurred during only one billing period, the bill shall be so computed.

(3) (a) Credits due a customer because of meter inaccuracies, errors in billing, or misapplication of rates shall be shown separately and identified.

(b) The original billing rendered because of meter inaccuracy, or errors in billing, shall be separated from the regular bill and the charges explained in detail. Subsequent to the first billing the amount can be shown as a separate item on the regular bill.

(4) At the end of each billing period the utility shall read all prepayment meters, calculate the customer's bill at the regular net rates applicable, report the amount of money in the meter, and bill, refund, or credit the account with the difference between the bill at the regular rates and the amount collected, provided the same customer has received service during the entire billing period. Credits shall be liquidated at least once a year and upon termination of service.

(5) Each bill for service shall be computed at the proper filed rate and the rate used shall be the cheapest applicable rate based on 12 months' use of service. If the customer's use is such that it is difficult to be certain what rate should be applied until there has been 12 months' use, the billing shall be adjusted on the 12th bill.

(a) This rule does not prohibit contracts having terms longer than 1 year but does require that the rates in such contracts be the lowest on file with the commission.

(b) This rule applies to service as it is being supplied. If the customer could reduce his bills by installing equipment, combining or separating services, he should be notified as required by section PSC 113.12 (2) but no change in rates shall be made until the customer makes the necessary changes.

PSC 113.17 Adjustment of bills. (1) Whenever a meter creeps or whenever a var meter or watthour meter installation 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.

(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.-hrs. per month, and involves no billings other than for 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 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.

(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.

History: 1–2–56; am. (5), Register, October, 1965, No. 118, eff. 11–1–65. **11-1-65.**

PSC 113.18 Billings for grounds. Subject to the utility's rules setting forth the method of determining a reduced rate herein authorized, if an accidental ground is found on a customer's wiring or equipment,

the utility may estimate the kilowatt-hours so lost and bill for them at a reduced rate not less than the generated or purchase cost of the energy, but no such adjustment shall be made for energy supplied after the customer has been notified and has had an opportunity to correct the condition. Any demand (kilowatt) caused by an accidental ground may be billed at a rate lower than that filed for the class of service involved. The utility shall notify the customer of the ground whenever it is found or suspected.

PART IV

REQUIREMENTS AS TO UTILITY RECORDS

(See also sections PSC 113.29, 113.42, 113.43 and 113.45)

PSC 113.19 Employes authorized to enter customers' premises. The utility shall keep a record of employes authorized pursuant to section 196.171, Wis. Stats., to enter customers' premises.

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

PSC 113.21 Customers' complaints. Each utility shall investigate and keep a record of complaints received by it from its customers in regard to safety, service, or rates, and the operation of its system. The record shall show the name and address of the complainant, the date and nature of the complaint, and its disposition and the date thereof.

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.

(2) When complete distribution systems or portions of communities have service furnished from unattended stations, these records shall be kept to the extent practicable. The record of unattended stations shall show interruptions which require attention to restore service, with the estimated time of interruption. Breaker or fuse operations affecting service should also be indicated even though duration of interruption may not be known.

PSC 113.23 Metering equipment records. (1) A test record shall be made whenever a unit of metering equipment is tested but need not be retained after the equipment is again tested if a complete history record is maintained. This record shall show information to identify the unit and its location; equipment with which the device is associated; the date of test; reason for the test; readings before and after the test; a statement as to whether or not the meter "creeps" and in case of creeping, the rate; a statement of "as found" and "as left" accuracies sufficiently complete to permit checking of the calculations

employed; indications showing that all required checks have been made; a statement of repairs made, if any, and identification of the testing standard and the person making the test.

(2) Each utility shall keep a record for each unit of metering equipment showing when the unit was purchased; its cost; utility's identification; associated equipment; essential name-plate data; dates of tests; results of all "as found" and "as left" tests unless separate records are kept of each test for each unit; and locations where installed with dates of installation and removal.

(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, 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. 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.

History: 1–2–56; am. (3), Register, December, 1957, No. 24, eff. 1–1–58.

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
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.

* 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.

PART V

VOLTAGE, CURRENT, AND FREQUENCY STANDARDS

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 the customer-owned service to the company-owned conductors, shall be reasonably constant within the following limits:

(1) (a) For all retail service, except power service, rendered in urban communities in which the utility serves 500 or more separate customers, the variation of voltage shall be no more than 5% above or below the standard voltage at any time and in addition:

(b) For commercial customers who must depend on electricity for lighting a large part of the time, the variation of voltage from maximum to minimum shall not exceed 6% of the standard voltage from 8 a.m. to 11 p.m. For all others, including residential customers, the 6% variation shall apply from one-half hour before sunset to 11 p.m.

(2) (a) For all retail service except power service rendered in urban communities in which the utility serves between 100 and 500 separate customers, the variation of voltage shall be not more than 5% above or below the standard voltage at any time and in addition:

(b) Between the hours of one-half hour before sunset and 11 p.m., the variation of voltage from maximum to minimum shall not exceed 8% of the standard voltage.

(3) (a) 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 voltage shall be not more than 6% above or below the standard voltage at any time and in addition:

(b) Between the hours of one-half hour before sunset and 11 p.m., the variation of voltage from maximum to minimum shall not exceed 8% of the standard voltage.

(4) For retail power service, the voltage variation shall not exceed 10% above nor 10% below the standard voltage. The term "power service" as used herein means service furnished principally for electromotive or industrial purposes and may include service for lighting incident thereto, as defined in the utility's rates and rules.

(5) For retail combined lighting and power service, the voltage variation shall not exceed the limits provided under section PSC 113.25 (1), (2), or (3), as the case may be. In connection with the rates applicable to combined lighting and power service each utility shall file rules and regulations setting forth the characteristics of utilization equipment permitted under the rates.

(6) For service rendered to public utilities and others for resale, the voltage shall be as mutually agreed upon by the parties concerned and shall, except with respect to interchange contracts, be adequate to make possible with standard local regulation, voltage maintenance on distribution systems of standard and adequate construction for the loads carried, which conforms to the requirements of the other provisions of this rule.

(7) The variation of voltage allowed for in (1) to (6), inclusive, shall be a gradual change in voltage as a result of normal changes in load.

PSC 113.26 Standard and maintenance of constant current circuits. (1) Equipment supplying constant current circuits shall be so adjusted as to furnish as nearly as practicable the rated current of the circuit supplied, and in no case shall the current vary more than 4% above or below the rating of the circuit.

(2) At least once in each year the current output of the equipment supplying constant current circuits shall be checked and the equipment adjusted if necessary.

PSC 113.27 Standard frequency. (1) Each utility supplying alternating current service shall adopt a standard service frequency for each of the several areas into which its system may be divided, and shall file with the commission a statement of the standard frequencies adopted. Under normal operating conditions the utility shall maintain the frequency to within 5% above and 5% below the standard during all hours.

(2) Each utility generating all or a substantial part of its requirements shall have at its main generating station or stations, in order to indicate average frequency, a master clock or other equipment which shall, if necessary, be adjusted to correct time at 11 a.m. of each day. Every reasonable effort shall be made to operate at the standard frequency adopted.

(3) Exemption from the requirements of this rule relating to average frequency may be granted by the commission upon application and good cause shown therefor, subject to such reasonable terms and conditions as may be imposed for the protection of the public.

(4) Utilities shall make all reasonable efforts to minimize the effects of higher harmonics.

PSC 113.28 Variations of voltage, current and frequency. (1) Variations of voltage, current, and frequency in excess of those specified in sections 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).

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 commis-

sion 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.

PART VI

GENERAL REQUIREMENTS AS TO METERING

PSC 113.30 Measuring energy on system. Where practical to do so, all electrical quantities required to be reported to the commission shall be metered. Quantities may be calculated when permitted by section PSC 113.31.

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. 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.

PSC 113.32 One point of 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.

PSC 113.33 Metering at point of interchange and for customers' operating generating equipment. (1) 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 device to prevent reverse registration and be so connected as to meter separately energy flow in each direction.

(2) Reactive metering shall not be employed for determining average power factor where energy may flow in either direction or where customer may generate an appreciable amount of his requirements at any time unless suitable directional relays and ratchets are installed to obtain correct registration under all conditions of operation and unless the general plan of installation is approved by the commission.

PSC 113.34 Type of instruments. All electric service of the same type rendered under the same rate schedule shall be metered with instruments having like characteristics, except that the commission may 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 one schedule shall be ratcheted.

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 all watthour meters. Meters already in service may be so marked when they come to the meter shop.

PSC 113.36 Meter compensation. (1) Metering equipment shall not be set "fast" or "slow" to compensate for supply transformer or line losses.

(2) Loss compensators designed to be used with meters and which accurately add iron and/or copper losses may be used. The compensator shall carry a tag identifying the compensation and shall be tested when the associated meter is tested and when the associated supply equipment or lines are changed.

History: 1–2–56; renum. to be (1) and cr. (2), Register, October, 1965, No. 118, eff. 11-1-65.

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 shall be sealed.

(2) Where the entrance switch is combined with meter-test facilities, or is installed on the supply side of the meter, the entrance switch boxes may be sealed by the utility. The customer may remove the seal from any fuse compartment to replace fuses if the utility is promptly notified that such seal has been broken.

(3) Where a utility supplies different classes of service at different rates to the same premises, such as lighting service and electric water heating service, the utility may seal the service switches.

(4) Sealing and resealing shall be without charge to the customer.

(5) This rule shall not require modernization of old installations or the sealing of installations which cannot practicably be sealed. Sealing shall not be such as to interfere with the operation of any switch or protective equipment.

PSC 113.38 Location of meters. (1) The following constitute recommendations by the commission as to the location of metering equipment and test facilities:

(a) All meters hereafter installed indoors should be located in the basement or first floor, or as near as possible to the service, in a clean, dry, safe place, not subject to great variations in temperature, and on a support free from appreciable vibration. Metering equipment installed out of doors should be protected from the weather or should be especially designed for outdoor use and be compensated for temperature variations.

(b) Meters should not be placed in coal or wood bins or on the partitions forming such bins, nor on any unstable partitions or supports. Meters should not be installed in attics, living rooms, bathrooms, show windows, or restaurant kitchens, over doors, over windows, or in any location where readings or tests will cause annoyance to the customer.

(c) Meters should be easily accessible for reading, testing, and making necessary adjustments and repairs. When a number of meters are placed on the same meter board, the distance between centers of direct-current meters should be not less than 15 inches; and between centers of alternating-current meters not less than 8½ inches vertically or 7½ inches horizontally. 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 on pad-mounted transformers where they shall be placed as high as practicable. On individual installations of meters indoors, the meter should not be 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. For meters installed both indoors and outdoors, there should be a minimum of 3 feet of unobstructed space in front of the meter, measured from the surface on which the meter is mounted.

(2) 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 (kilowatt-hours and reactive power for example), the meters shall be tagged to indicate what they are recording.

(3) 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.

History: 1–2–56; am. (1) (c), Register, October, 1965, No. 118, eff. 11-1-65.

PSC 113.39 Rental charge for meters. The utility may charge a meter rental for extra meters installed for the customer's convenience or because of governmental requirements.

PART VII

REQUIREMENTS AS TO ACCURACY AND TESTING OF METERING EQUIPMENT

PSC 113.40 Accuracy of watthour meters. (1) Watthour meters used for measuring electrical quantities supplied to customers shall:

(a) Be of proper design for the circuit on which they are used, be properly connected and installed, be in good mechanical condition, have adequate insulation, correct internal connections, and correct register.

(b) Not creep at "no load" a full revolution of the disk in 10 minutes or less when the load wires are disconnected and potential is impressed or in a test in the shop where the load wires are disconnected and the permissible voltage variation impressed. If the rate of creep can be determined in a shorter interval, it is not necessary to wait the full 10-minute period.

(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 nameplate. For meters used with current transformers the reference test current shall be the secondary rating of the current transformers.

(d) If they are designed for use on direct-current circuits, be accurate to within plus or minus 1% at two loads, one equal to approximately 10% and the other between 75% and 100% of the test current or customer's maximum ampere demand. The test current shall be the ampere rating or the test ampere rating, whichever is shown on the nameplate.

(2) Polyphase meters shall have their stators in balance within 2% at 100% load at unity and at approximately 50% lagging power factor.

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

(4) Prepayment meters shall be maintained at the same accuracy and read at the same periods as regular meters.

History: 1–2–56; am. (1) (a), (b), (c), (d) and (2), Register, October, 1965, No. 118, eff. 11-1-65.

PSC 113.41 Accuracy of demand meters. (1) A demand meter, demand register, or demand attachment used to measure customer's service shall:

(a) Be in good mechanical and electrical condition.

(b) Have proper constants, indicating scale, contact device, and resetting device.

(c) Not register at no load.

(d) Be accurate to the following degrees: 1. Curve drawing meters which record quantity time curves, and integrated-demand meters shall be accurate to within plus or minus 2.0% of full scale throughout their working range. Timing elements measuring specific demand intervals shall be accurate to within plus or minus 2.0% and the timing elements which serve to provide a record of the time of day when the demand occurs shall be accurate to within plus or minus 4 minutes in 24 hours.

2. Lagged-demand meters shall be accurate to within plus or minus 4% of full scale at final indication.

PSC 113.42 Requirements as to instrument transformers. (1) Instrument transformers used in conjunction with metering equipment to measure customers' service shall:

(a) Be in proper mechanical condition and have electrical insulation satisfactory for the service on which used.

(b) 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	10% Current	100% Current
Purchased after January 1, 1942 ------	1%	.75%	3%	2%
Purchased prior to January 1, 1942 --	2%	1.50%	5%	3%

(2) (a) Meters used in conjunction with instrument transformers shall be adjusted so that the over-all accuracies will come within the limits specified in sections PSC 113.40 and 113.41.

(b) Instrument transformers shall be tested with the meter with which they are associated by making an over-all test, or may be checked separately. If the transformers are tested separately, the meters shall also be checked to see that the over-all accuracy of the installation is within the prescribed accuracy requirements.

(c) The results of tests of instrument transformers shall be kept on record and available for use when transformers are installed.

(3) Phase shifting transformers shall have secondary voltages under balanced line-voltage conditions within 1% plus or minus of the voltage impressed on the primary.

PSC 113.43 Portable indicating instruments. All portable indicating electrical instruments used for determining quality of service to customers or for billing purposes, such as voltmeters, ammeters, and watt meters, shall be checked against suitable secondary reference standards at least once in each 6 months. If the portable indicating instrument is found appreciably in error at zero or in error by more than 1% of indication at commonly used scale deflections, it shall be adjusted. A history and calibration record shall be kept for each such instrument.

PSC 113.44 Testing equipment. (1) Each utility shall maintain sufficient laboratories, meter testing shops, secondary standards, instruments, and facilities to determine the accuracy of all types of meters and measuring devices used by the utility. A utility may, however, have all or part of the required tests made or its portable testing equipment checked by the commission's electric standards laboratory at the university of Wisconsin or with the approval of the commission by another utility or agency having adequate and sufficient testing equipment to comply with these rules.

(2) Each utility shall have the following minimum testing equipment available:

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

(b) Portable indicating instruments of such various types as are required to determine the accuracy of all instruments used by the utility.

(c) One or more secondary standards to check each of the various types of rotating standards used for testing watthour meters. Each

secondary standard shall consist of either an approved rotating standard 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.

(d) Suitable standards which are not used for field work to check portable instruments used in testing.

(3) Any utility having more than 10,000 customers, or any other utility upon approval of the commission, may provide and use primary standards consisting of precision instruments, timing devices, potentiometers, standard cells, etc.

PSC 113.45 Accuracy of test standards. (1) (a) Utilities maintaining primary standards such as precision wattmeters, volt boxes, resistances, standard cells, and timing devices shall have such standards certified at the time of purchase as to accuracy by a recognized laboratory other than that of the manufacturer of the standard.

(b) Utilities having standard cells shall intercompare them regularly and shall have at least one of them checked by a standardizing laboratory at intervals of not more than 2 years. Reference standards of resistance, potentiometers, and volt boxes shall be checked at intervals of not more than 3 years.

(2) (a) Secondary watthour-meter standards shall not be in error by more than plus or minus 0.3% at loads and voltages at which they are to be used, and shall not be used to check or calibrate working standards unless the secondary standard has been checked and adjusted, if necessary, to such accuracy within the preceding 12 months. Each secondary standard watthour meter shall have a calibration curve available and a history card.

(b) Any 2 or more of at least 3 watthour meters may be used as a secondary standard to check portable rotating standards provided there is no discrepancy in accuracy between any two of the watthour meters used of more than 0.2% at standard test loads. Calibration and history records shall be maintained for each of the meters used as secondary standards.

(3) Secondary standards indicating instruments shall not be in error by more than plus or minus 0.5% of indication at commonly used scale deflection and shall not be used to check or calibrate portable indicating instruments unless the secondary standard has been checked, and adjusted, if necessary, within the preceding 12 months. A calibration record shall be maintained for each standard.

(4) (a) All working rotating standards 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 the induction type. Working rotating standards infrequently used shall be compared with a secondary standard before they are used.

(b) Working rotating standards shall be calibrated annually (see Wis. Adm. Code section PSC 113.49 (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 rotating standard.

(5) The meter accuracies herein required as to all primary, secondary, and portable standards and service measuring equipment shall be referred to 100%.

History: 1-2-56; am. (4) (b) and (5), Register, October, 1965, No. 118, eff. 11-1-65.

PSC 113.46 Testing of metering equipment. (1) The test of any unit of metering equipment shall consist of a comparison of its accuracy with a standard of known accuracy. Units not properly connected or not meeting the accuracy or other requirements of sections PSC 113.40, 113.41, and 113.42 at the time of test shall be reconnected and 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) Self-contained single-phase meters and 3-wire network meters together with associated equipment such as demand devices, control devices, etc.:

(a) 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:

1. Within a period of 12 months before to 60 days after they are placed in service.
2. When they are suspected of being inaccurate or damaged.
3. When the accuracy is questioned by a customer.
4. Before use when they have been inactive for more than one year.
5. When they are removed from service.
6. Within a period of 6 months before to 6 months after 96 months of service or in accordance with the plan outlined in Wis. Adm. Code section PSC 113.465.

(b) Shall be inspected for mechanical and electrical faults whenever the accuracy of the device is checked.

(c) Shall have the register and the internal connections checked before the meter is first placed in service and whenever the meter is repaired.

(d) Shall have the connection to the customer's circuits checked when the meter is tested on the premises or removed.

(e) Shall be tested for accuracy at 50% power factor before first being used for measuring customer's service.

(3) Self-contained polyphase meters together with associated equipment such as demand equipment, phase-shifting transformers, control devices, etc.:

(a) Shall be tested on the customer's premises (except No. 1 below) for accuracy at unity and 50% power factor: (Exception: Thermal demand meters and socket-type self-contained polyphase meters may be tested at a central testing point or in a mobile testing laboratory.)

1. Before being placed in service.
2. On the premises within 60 days after installation.
3. When they are suspected of being inaccurate or damaged.
4. When the accuracy is questioned by a customer.

5. Before use when they have been inactive for more than 1 year.

6. When they are removed from service.

7. Within a period of 3 months before or 3 months after 72 months' service.

(b) Shall be inspected for mechanical and electrical faults whenever the accuracy is checked.

(c) Shall have the register and internal connections checked before the meter is first installed or when repaired.

(d) Shall have the connections to the customer's circuits checked whenever the equipment is tested for accuracy.

(4) Meters used with instrument transformers on single-phase service together with associated equipment such as demand equipment, phase-shifting transformers, control devices, instrument transformers, etc.:

(a) Shall be tested for accuracy at unity power factor on the customer's premises: (Exception: Thermal demand meters may be tested at a central testing point or in a mobile testing laboratory.)

1. Before being placed in service.

2. On the premises within 60 days after installation.

3. When they are suspected of being inaccurate or damaged.

4. When the accuracy is questioned by a customer.

5. Before use when they have been inactive for more than 1 year.

6. When they are removed from service.

7. Within a period of 4 months before or 4 months after 96 months of service.

(b) Shall be inspected for mechanical and electrical faults whenever the accuracy is checked.

(c) Shall have the register and the internal connections checked before the meter is first placed in service and whenever the meter is repaired.

(d) Shall have the connections and multipliers checked whenever the meter is tested or removed and whenever an instrument transformer is changed.

(e) Shall be checked for accuracy at 50% power factor before first being used for measuring customers' service.

(5) Meters used with instrument transformers on polyphase service together with associated equipment such as demand equipment, phase-shifting transformers, control devices, instrument transformers, etc.:

(a) Shall be tested for accuracy at unity and 50% power factor on the customer's premises: (Exception: Thermal demand meter may be tested at a central testing point or in a mobile testing laboratory.)

1. Before being placed in service.

2. On the premises within 60 days after installation.

3. When they are suspected of being inaccurate or damaged.

4. When the accuracy is questioned by a customer.

5. Before use when they have been inactive for more than 1 year.

6. When they are removed from service.

7. Within a period of 2 months before or 2 months after 24 months' service.

(b) Shall be inspected for mechanical and electrical faults whenever the accuracy is checked.

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

(d) Shall have the connections and multipliers checked whenever the meter is tested or removed and whenever an instrument transformer is changed.

(6) Instrument transformers shall be tested:

(a) When first received.

(b) When removed from service.

(c) Upon complaint.

(d) When there is evidence of damage.

(e) 1. In conjunction with meters whenever the meter is tested, or

2. Whenever 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 indicating voltmeter in the case of potential transformers) made in conjunction with each field test of the meter provides evidence that the instrument transformer should be tested, or

3. Tested separately every 10 years. When tested separately, the test data shall be recorded and the meters adjusted to insure the overall accuracies specified in Wis. Adm. Code sections PSC 113.40, PSC 113.41 and PSC 113.42.

(7) Direct current meters, shunts, and associated equipment:

(a) Shall be tested for accuracy:

1. Before the meter is placed in service.

2. On the customer's premises within 60 days after installation.

3. When meter installations having a capacity of 6 kw. or less have been in service 42 months; 6 kw. to 100 kw. have been in service 18 months; and for larger installations when they have been in service 12 months.

4. When they are suspected of being inaccurate or damaged.

5. When the accuracy is questioned by a customer.

6. Before use when they have been inactive for more than 1 year.

7. When they are removed from service.

(b) Shall be inspected for mechanical and electrical faults whenever the accuracy is checked.

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

(8) Each utility shall promptly make a test of any metering installation upon request of the customer if 6 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.

(9) 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 var meter creeps or if the error in registration is more than 2% fast (average error as defined in section PSC 113.48), 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:

Direct current or single phase	
Self-contained	
12 kv.-a. or below	$2
Over 12 kv.-a.	$8
Polyphase meters	
Self-contained	
12 kv.-a. or below	$6
Over 12 kv.-a.	$8
Instrument transformer	
For each transformer tested	$4
Demand meters	
Same as watthour meter if meter is separate	
For demand attachment	$5

History: 1–2–56; (4) (e) r. and recr., Register, December, 1957, No. 24, eff. 1–1–58; am. (2) and (3); renum. (4) to be (6) and am. (6) (e) 2; renum. (5), (6) and (7) to be (7), (8) and (9); cr. (4) and (5), Register, October, 1965, No. 118, eff. 11-1-65.

PSC 113.465 Variable interval plan. (1) The variable interval plan described below may be used for testing self-contained, single-phase meters and 3-wire network meters instead of the periodic 96-month test period in section PSC 113.46 (2) (a) 6. 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 load 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 20%; and the minimum value shall be not less than:

6.25% for a group of 2,000 or more meters.

125 meters or 12½%, 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:

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

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.

History: Cr. Register, October, 1965, No. 118, eff. 11-1-65.

PSC 113.47 Methods of test. (1) In all tests of watthour meters where comparison of revolutions is made, at least 2 revolutions of the meter under test shall be taken at light load and at least 9 revolutions at heavy load. At least 2 checks shall be made at each load. The accuracy of the meter under test at each load shall be the average accuracy determined from 2 checks taken at the same load which must agree within 0.2 of 1% unless the meter is erratic. However, if a mechanical testing device is used, the test procedure may be modified provided equal accuracy of method is maintained.

(2) If the watthour meter has a contact device which operates a demand mechanism, the disk revolutions when testing should be multiples of the number of revolutions per contact in order to take account of the varying friction which may be present during the movement of the contact cam from one contact to the next.

(3) Polyphase meters shall be tested by one of the following 4 methods:

(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).)

(b) Individual stator test with the potential circuits connected in parallel and each current circuit tested separately. (For 2-stator, 4-wire delta meters, the current circuits of the 3-wire stator should be connected in series and treated as a single circuit. Three-stator, 4-wire delta meters must have correct values of potential applied to the differently rated circuits.) The light load test current shall be one-tenth N times the reference test current and the heavy load test current shall be between one-half and one N times the reference test current but not more than twice the test ampere rating of the meter. (N equals the number of stators in the meter except for 2-stator,

3-phase, 4-wire wye meters. For the latter, N shall be 4 for the current circuits which are not common to both stators and N shall be 2 for the current circuit common to both stators.)

(c) Individual stator test with the potential circuits connected to the polyphase circuit in the same manner as in service. (For 2-stator, 4-wire delta meters the current circuits of the 3-wire stator shall be connected in series and treated as a single circuit.) The light load test current shall be one-tenth N times the reference test current and the heavy load test current shall be between one-half and one N times the reference test current but not more than twice the test ampere rating of the meter. (N equals the number of stators in the meter except for 2-stator, 3-phase, 4-wire meters. For the latter N shall be 3 for each current circuit.)

(d) Polyphase test with the meter connected to a polyphase circuit in the same manner as in service, with balanced polyphase currents on the current circuits. This requires the use of a polyphase standard watt-hour meter or as many single-phase standards as there are current circuits under test.

(4) Instrument transformers shall be tested with a burden equivalent to that with which they are to be used or with burdens from which curves showing the accuracy of the transformer can be derived. Any approved method may be used for testing instrument transformers.

History: 1–2–56; r. and recr. (3), Register, October, 1965, No. 118, eff. 11-1-65.

PSC 113.48 Determination of average meter error. Whenever a metering installation is found upon any test to be in error by more than 2% at any test load, the average error shall be determined in one of the following ways:

(1) If the metering installation is used to measure a load which has practically constant characteristics, such as a street-lighting load, the meter shall be tested under similar conditions of load and the accuracy of the meter "as found" shall be considered as the average accuracy.

(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.

(3) If a polyphase metering installation is used on a varying load, the average error shall be the weighted algebraic average of its error at light load given a weighting of 1, its error at heavy load and 100% power factor given a weighting of 4, and at heavy load and 50% lagging power factor given a weighting of 2.

(4) If a load, other than the light, heavy, and low power-factor load specified for routine testing, is more representative of the customary use of the metering equipment, its error at that load should also be determined. In this case the average error is to be computed by giving the error at such load and power factor a weighting of 3 and each of the errors at the other loads (light, heavy, and 50% lagging power factor) a weighting of 1. Each error shall be assigned its proper sign.

PSC 113.49 Check of standards by commission. (1) Once each year, one of each type of rotating standard (60 cycle, 25 cycle, and direct current) and once each 2 years one of each type of portable indicating voltmeter, ammeter, wattmeter, and other test instruments shall be submitted to the Electrical Standards Laboratory at the University of Wisconsin for a check of accuracy.

(2) Each utility which normally checks its own working rotating standards 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.