

CHAPTER 25. SUBSTANTIVE RULES APPLICABLE TO ELECTRIC SERVICE PROVIDERS.

Subchapter C. QUALITY OF SERVICE.

§25.51. Power Quality.

(a) **Voltage variation.**

- (1) **Standard nominal voltages to be adopted.** In addition to the nominal voltages that each electric utility has already adopted, each nominal voltage adopted by an electric utility after approval of this rule shall be a voltage indicated by the version of the American National Standards Institute, Incorporated (ANSI) Standard C84.1, *Electrical Power Systems and Equipment-Voltage Ratings (60Hz)*, or equivalent ANSI standard as later amended, in effect at the time of adoption of the nominal voltages. An electric utility may adopt different nominal voltages to serve specific customers if such action does not compromise prudent transmission and distribution system operation.
- (2) **Nominal voltage limitations.** So far as technologically practicable, each electric utility shall maintain its standard distribution system nominal voltages within the limits specified in the *current version* of ANSI Standard C84.1, or equivalent ANSI standard as later amended. Each electric utility offering service at transmission voltages to customers who have their own transformation equipment shall maintain such voltages within a range of plus or minus 10% of its adopted nominal voltages. Variations in distribution system voltage in excess of the limits specified in ANSI C84.1 and transmission system voltages in excess of plus or minus 10% caused by action of the elements and infrequent and unavoidable fluctuations of short duration due to station or system operation shall not be considered violations of this subsection.

- (b) **Frequency variation.** Each electric utility supplying alternating current shall adopt a standard frequency of 60 Hertz. This frequency shall be maintained within the limits stated in the current version of the North American Electric Reliability Council (NERC) operating manual, or succeeding NERC document that may subsequently replace the operating manual.

- (c) **Harmonics.** In 60 Hertz electric power systems, a harmonic is a sinusoidal component of the 60 Hertz fundamental wave having a frequency that is an integral multiple of the fundamental frequency. "Excessive harmonics," in this subsection, shall mean levels of current or voltage distortion at the point of common coupling between the electric utility and the customer outside the levels recommended in the IEEE standard referenced in paragraph (1) of this section. Each electric utility shall assist every customer affected with problems caused by excessive harmonics and customers affected in exceptional cases as described in paragraph (5) of this section.

- (1) **Applicable standards.** In addressing harmonics problems, the electric utility and the customer shall implement to the extent reasonably practicable and in conformance with prudent operation the practices outlined in IEEE Standard 519-1992, *IEEE Recommended Practices and Requirements for Harmonic Control in Electric Power Systems*, or any successor IEEE standard, to the extent not inconsistent with law, including state and federal statutes, orders, and regulations, and applicable municipal regulations.
- (2) **Investigation.** After notice by a customer that it is experiencing problems caused by harmonics, or if an electric utility otherwise becomes aware of harmonics conditions adversely affecting a customer, the electric utility shall determine whether the condition constitutes excessive harmonics. If so, the electric utility shall investigate and determine the cause of the excessive harmonics.
- (3) **Excessive harmonics created by customer.** If an electric utility determines that a customer has created excessive harmonics that causes or are reasonably likely to cause another customer to receive unsafe, unreliable or inadequate electric service, the electric utility shall provide written notice to the customer creating excessive harmonics. The notice shall state that the utility has determined that the customer has created an excessive harmonics condition and that the utility has explained the source and consequences of the harmonics problem. The notice shall give the customer two options to cure the problem.

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§25.51(c)(3) continued

- (A) The electric utility may cure the problem by working on the customer's electric facilities at a mutually agreeable time and assess the repair costs to the customer.
- (B) The customer may elect to cure the problem at its option and its cost, but the remedy must occur within a reasonable time, which will be specified in the notice.
- (4) **Failure of the customer to remedy the problem.** Failure of the customer to remedy the problem may require the electric utility to disconnect the customer's service. The electric utility shall then remedy the excessive harmonics condition, or the electric utility may determine that the customer has remedied the condition within the time specified. In the event the customer refuses to allow the electric utility to remedy the problem and does not stop creating excessive harmonics within the time specified, the electric utility may disconnect the customer's service. Before disconnecting pursuant to this subsection, the electric utility must provide written notice of its intent to disconnect at least five working days before doing so, unless the customer grants the utility access to its electric facilities or ceases creating excessive harmonics. The electric utility may disconnect the customer five working days after providing the notice, unless the customer grants the electric utility access to its electric facilities or ceases creating excessive harmonics.
- (5) **Excessive harmonics created by an electric utility or third party.** If an electric utility determines that its operation or facilities, or the operations or facilities of a third party other than a customer, created excessive harmonics that causes or is reasonably likely to cause a customer to receive unsafe, unreliable or inadequate electric service, the electric utility shall remedy the excessive harmonics condition at the earliest practical date.
- (6) **Excessive total harmonic distortion created by two or more harmonic sources within IEEE 519 limits.** If, in its investigation of a harmonics problem, an electric utility determines that two or more customers' harmonic loads are individually within IEEE 519 limits but the sum of the loads are in excess of the IEEE 519 limits, the utility may require each customer to reduce its harmonic levels beyond the limits specified in IEEE 519.
- (7) **Cost responsibility.**
 - (A) Customer-created excessive harmonics. Electric utilities that remedy a customer-created excessive harmonics condition shall assess that customer a fee for the investigation and repair of the condition. Where a customer has remedied the condition, the electric utility shall assess the customer a fee for investigating the problem. The electric utility shall charge all applicable fees if required to disconnect the customer. An electric utility fee for investigation and repair of customer-created excessive harmonics conditions must be reasonable under the circumstances, and shall equal the electric utility's actual costs incurred, including its reasonable administrative costs.
 - (B) Electric utility-created and third party-created excessive harmonics. Each electric utility that created an excessive harmonics condition, or that investigated or remedied an excessive harmonics condition created by a third party other than a customer, must bear the costs incurred in investigating and remedying the condition, and shall not assess any fees to the affected customer.
- (8) **Cooperatives.** In fulfilling any of the responsibilities described in this subsection, a retail distribution cooperative that is a member of a generation and transmission (G & T) cooperative may request the G & T cooperative's assistance. The retail distribution cooperative bears full responsibility for ensuring that this subsection's requirements are fulfilled.

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- (d) **Power quality monitoring.** Each electric utility shall provide, maintain, calibrate, and use appropriate power monitoring instruments to investigate power quality complaints from its customers and to determine the cause of disturbances and power quality problems on the utility's system. In addressing power quality monitoring, each electric utility shall implement to the extent reasonably practicable and in conformance with prudent operation the practices outlined in IEEE Standard 1159-1995, *IEEE Recommended Practice for Monitoring Electric Power Quality*, or any successor IEEE standard, to the extent not inconsistent with law, including state and federal statutes, orders, and regulations, and applicable municipal regulations.
- (e) **Voltmeters and voltage surveys.**
 - (1) **Voltmeters.** Each electric utility shall provide, maintain, and use portable voltmeters for testing voltage regulation, and electric utilities serving more than 250 meters shall provide, maintain, and use one or more portable recording voltmeters. These instruments shall be of a type and capacity suited to the voltage supplied.
 - (2) **Voltage surveys.** Each electric utility shall make a sufficient number of voltage surveys to adequately measure the character of service furnished its customers and to satisfy the commission of its compliance with the voltage requirements. Electric utilities having recording voltmeters shall keep at least one of these voltmeters in continuous service for the same purpose.