Republic of the Philippines
ENERGY REGULATORY COMMISSION
San Miguel Avenue, Pasig City

GUIDELINES FOR THE MONITORING OF POWER QUALITY STANDARDS FOR DISTRIBUTION UTILITIES

Pursuant to Section 43 (b) of Republic Act No. 9136, Rule 3 Section 4 (g) of its Implementing Rules and Regulations, and Articles 3.2 and 5.2 of the Philippine Distribution Code (PDC), the Energy Regulatory Commission (ERC) hereby adopts and promulgates the following Guidelines for the Enforcement of Power Quality Standards.

ARTICLE I

GENERAL PROVISIONS

Section 1. Objectives. These Guidelines shall have the following objectives:

a) To ensure that the Power Quality standards specified in Article 3.2 of the PDC are complied with.

b) To adopt rules and regulations for assessing the level of power quality of the Distribution System.

c) To adopt requirements for monitoring Power Quality in relation with a customer's complaint.

d) To provide well-defined data to allow trend analysis over time for a given utility or among Distribution Utilities.

e) To establish a way of tracking and identifying Power Quality problems.

f) To establish reporting requirements to provide Consumers, the ERC, and Distribution Utilities with methodology for monitoring Power Quality within a Distribution Utilities' franchise area.

ARTICLE II

SCOPE AND DEFINITION OF TERMS

Section 1. Scope. These Guidelines shall apply to:

a) Privately-owned Distribution Utilities;

b) Electric Cooperatives;

c) Local government unit owned-and-operated Distribution Utilities;

d) Entities duly authorized to own, operate and maintain Distribution facilities within the economic zones; and

e) Other duly authorized entities engaged in the Distribution of Electricity.

Section 2. Definition of Terms. As used in these Guidelines, the following terms shall have the following respective meanings:

(a) "**Act**" unless otherwise stated, refers to Republic Act No. 9136, otherwise known as the "Electric Power Industry Reform Act of 2001."

(b) "**Component**" refers to a piece of equipment, a line or circuit, a section of line or circuit, or a group of items, which is viewed as an entity for a specific purpose.

(c) "**Distribution System"** refers to the system of wires and associated facilities belonging to a franchised Distribution Utility extending between the delivery points on the transmission, sub-transmission System, or a generating plant connection and the point of connection to the premises of the End-User.

(d) "**Distribution Utility**" refers to any electric cooperative, private corporation, government-owned utility or existing local government unit which has an exclusive franchise to operate a Distribution System in accordance with its franchise and the Act.

(e) "**Distributor**" has the same meaning as Distribution Utility.

(f) "**Grid**" refers to the high voltage backbone System of interconnected transmission lines, substations, and related

facilities for the conveyance of bulk power. Also known as the Transmission System.

(g) "**Long Duration Voltage Variation**" refers to a variation of the Root-Mean-Square (RMS) Value of the voltage from nominal voltage for a time greater than one (1) minute.

(h) "**Low Voltage**" refers to a voltage level not exceeding 1000 volts.

(i) "**Medium Voltage**" refers to a voltage level exceeding one (1) kV up to 34.5 kV.

(j) **"Nominal Voltage"** refers to a nominal value assigned by a Distribution Utility to a circuit or system of a given voltage class, for the purpose of convenient designation.

(k) "**Power Quality**" refers to the quality of the voltage, including its frequency and resulting current, that are measured in the Grid, Distribution System, or any User System.

(l) "**Reliability**" refers to the probability that a System or Component will perform a required task or mission for a specified time in a specified environment. It is the ability of a power System to continuously provide service to its Customers.

(m) "**RMS Value"** of a complex voltage wave is equal to the square root of the sum of the squares of the RMS values of its individual components.

(n) "**System**" refers to the Distribution System or any User System. Also, a group of Components connected or associated in a fixed configuration to perform a specified function.

(o) "**Transmission System**" has the same meaning as Grid.

(p) **"Voltage Variation"** refers to the deviation of the root-mean-square (RMS) value of the voltage from its nominal value, expressed in percent.

ARTICLE III

VOLTAGE VARIATION

Section 1. Nominal Voltage. Each Distributor shall adopt a standard Nominal Voltage or voltages which are consistent with the design of the Distribution System for its entire service area and for each of the districts, zones, or work centers into which the Distribution Systems are divided.

Section 2. Limits. Each Distributor shall ensure that no under-voltage or over-voltage is present at the connection point of any User during normal operating conditions. For this standard, connection points shall be considered as the points where medium voltage customers are connected/metered or the primary of the distribution transformers in the case of low voltage customers.

A Long Duration Voltage Variation is an Under-Voltage if the RMS Value of the voltage is less than or equal to 90 percent of the nominal voltage.

A Long Duration Voltage Variation is an Over-voltage if the RMS Value of the voltage is greater than or equal to 110 percent of the nominal value.

Section 3. Measurement Procedures. A Distributor shall make voltage measurements for detecting variations at the metering point or at a convenience outlet of a Medium Voltage customer.

The voltage at the primary of a distribution transformer, which serves as connection point for Low Voltage customers, can be measured at the metering point or at a convenience outlet of the first customer served by the distribution transformer.

The voltage at the primary of a distribution transformer can be computed, by multiplying the measured voltage at the metering point or at the convenience outlet of the first customer served by the distribution transformer with the nominal primary voltage, divided by the nominal secondary voltage.

Section 4. Probability Level. Each Distributor shall be allowed a probability level, of not lower than 95 percent, that all connection points for each feeder should have measurements of voltages within the limits specified in Section 3.2.3.3 of the PDC.

Section 5. Voltage Outside the Limits not Considered a Violation. Voltage outside the limits specified in Section 2 shall not be considered a violation of this rule when such variations:

a) Arise from operation of the affected customer's equipment at low power factor;

b) Arise from unbalance operation of the affected customer's equipment; or

c) Arise from scheduled maintenance on equipment.

Section 6. Voltage Surveys. Each Distributor shall, for voltage survey purposes and to assure compliance with the voltage requirements, make a voltage test at all connection points in each feeder of the Distribution System:

a) Once during or near a monthly peak period, and

b) Once during or near a monthly off-peak period.

Section 7. Required Records. Records of voltage tests shall be sufficient to determine/indicate the following data/information:

a) Location

b) Serving Substation

c) Feeder or Circuit Number

d) Nominal Voltages

e) MV Customer or Transformer Number

f) Number of connected Customers

g) Measured Voltage

h) Date and Time voltage test was conducted

Section 8. Quarterly Reports. Records of monthly voltage tests shall be recorded in the prescribed format using Table-1PQ in Annex A and shall be submitted to the ERC in electronic copy using a Portable Document Format (PDF) or any other format that cannot be altered, on or before the end of the month

following the quarter starting year 2005. To be included in the quarterly submission are the monthly load curve data of the Distribution System during the quarter.

ARTICLE IV

OTHER POWER QUALITY STANDARDS

Section 1. Distributors Obligation to Monitor and Record Variations of Other Types of Power Quality Standards. The Distributor shall monitor and record variations of these other types of Power Quality standards; Voltage Sags, Voltage Swells, Voltage Unbalance, and Harmonics at all connection points to the Distribution System, to ensure that the Power Quality variations are within the limits specified in Section 3.2 of the PDC.

Section 2. Mitigation of the Impact of Customer's Loads. If in relation to a Power Quality complaint, an evaluation shows that a Customer's loads cause a problem on any of the Power Quality standards mentioned in the preceding section, the Distribution Utility in cooperation with the Customer causing the Power Quality problem shall be required to design mitigation strategy to reduce the impacts of the Customer's loads.

ARTICLE V

REPEAL AND SEPARABILITY

Section 1. Repeal and Separability. All existing rules, regulations or orders or any part thereof inconsistent with this Rules are herby repealed, amended or modified accordingly. If any part or provision of these Rules is declared unconstitutional or illegal, the other parts or provisions shall remain valid.

ARTICLE VI

EFFECTIVITY

Section 1. Effectivity. These Rules shall take effect fifteen (15) days after publication in two newspapers of general circulation in the country.

Pasig City, _____, 2004.

RODOLFO B. ALBANO, JR.
Chairman

OLIVER B. BUTALID
Commissioner

JESUS N. ALCORDO
Commissioner

RAUF A. TAN
Commissioner

ALEJANDRO Z. BARIN, JR.
Commissioner

Annex A

Table-1PQ

VOLTAGE VARIATION REPORT

For the Month of _____, Year _____

Distribution Utility:_____

District/Zone/or Work Center: _____

Substation serving: _____

Feeder No. _____

Nominal Voltages: _____

MV Customer Or Transformer Number	Location	Number of Connected Customers	Off Peak Period Date: _____			Peak Period Date: _____		
			Time of Test	Measured Voltage	Variation from Nominal Voltage	Time of Test	Measured Voltage	Variation from Nominal Voltage

_____
Signature over Printed Name of Responsible Person

Date: _____

Annex B

Formula for computing the Voltage at the Primary of the Distribution Transformer with measurement conducted at the metering point or at a convenience outlet of the first customer served by the distribution transformer:

$$V_p = V_s \times \frac{\text{Nominal Voltage}_{\text{primary}}}{\text{Nominal Voltage}_{\text{secondary}}}$$

Where:

V_p = Voltage at the primary of the distribution transformer.

V_s = Voltage measured at the metering point or at a convenience outlet of the first customer served by the distribution transformer.

Formula for computing the Probability Level for each Feeder:

$$\text{Probability Level} = \frac{N_T - N_{OL}}{N_T} \times 100\ \%$$

Where:

N_{OL} = Number of connection points in a Feeder with voltage variations outside the limits

N_T = Total number of connection points in a Feeder