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## **Abstracts**

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# THE NEED FOR POWER QUALITY TESTING STANDARDS

by  
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The quality of the power supplied to sensitive electronic equipment is an important issue. Quantifying this quality, however, is difficult under the present state of nonexistent or uncoordinated standards concerning two related questions: (1) what levels of power quality are required for what types of loads, and (2) what measurement techniques are required to determine reliably the level of disturbances that reduce quality.

Improvements in the situation described as "poor power quality" can be achieved by reducing the sensitivity of equipment to power line disturbances, or by limiting the injection of disturbances -- or better yet, by reducing both in a coordinated approach. While these remedies might seem obvious in principle, their implementation (enforcement) appears more difficult. Voluntary standards provide a guide for such an implementation. To that end, four types of standards are necessary: (1) measurements, to obtain correct and universally acceptable data; (2) equipment performance, to define both its tolerance to disturbances and its limits on emission of disturbances; (3) setting acceptable disturbance levels on the utility supply, to ensure compatibility of equipment with the utility supply; and (4) specifications for the performance of various type of power conditioning equipment used to provide higher quality power than what standard utility service can provide.

The first step towards recognizing a need for enhancing power quality is to determine the level of disturbances occurring in the system. The parameters characterizing a power supply are: frequency, amplitude, waveform, and symmetry (another important parameter is reliability, i.e., the absence of outages). The level of disturbances is generally determined by measurements conducted at the site of an existing or future installation. If the tolerance of the equipment for disturbances is known and the level of disturbances found by the site measurement is excessive, then corrective action is necessary: reducing the disturbance level, increasing the withstand capability of the equipment, or providing an interface such as a surge suppressor, a voltage regulator, or an uninterruptible power supply.

Because this additional line conditioning equipment may require significant capital investment, the choice of corrective measures is made by economic trade-off. However, if technical inputs to this trade-off are incorrect because erroneous conclusions result from a faulty site measurement, the whole process is worthless or misleading. In their review of power quality site surveys, Martzloff and Gruzs [1] discussed how one should deal, not with fiction or fallacies, but with facts.

Characterizing the disturbances and disturbance mechanisms involves detection (measurement) of their occurrence and description of the results of these measurements. One difficulty facing users of monitoring instruments in this fast-paced technology is that manufacturers are steadily improving their instruments. These improved features respond to specific wishes of the users or result from their own product research and development, a desirable situation. On the negative side, however, data collected by different instruments become equipment-dependent. Comparison of survey results by third parties is then difficult.

Some site surveys might aim at high accuracy but the real world experiences an infinite variety of disturbances, making it difficult to fit them into simple, orderly categories. Any attempt to describe these disturbances in fine detail restricts general usefulness of the data and can lead to illusions on applicable accuracy. What is really needed is a more uniform and compatible recording and reporting of the data. The formation by IEEE of a Standards Coordinating Committee on Power Quality responds to this need. Thus, we can look forward to improvements and new standards in the not-too-distant future.

1. Martzloff, F.D., and Gruzs, T.M., "Power Quality Site Surveys: Facts, Fiction, and Fallacies," *IEEE Transactions* IA-24, No.6, Nov/Dec 1988.

François Martzloff was born in France where he completed his undergraduate training, and came to the United States in the fifties to continue his graduate studies. In 1985, he joined the staff of the National Bureau of Standards (NBS), to expand NBS activities in the field of Conducted Electromagnetic Interference (CEMI). He is now concentrating on issues of power quality and surge protection. Prior to joining NBS (recently renamed the National Institute of Standards and Technology (NIST)), his long career at General Electric included high voltage fuses and bushings development, power electronics, transient measurements, surge protection of electronics, applications of varistors, and electromagnetic interference protection.

As an IEEE Fellow, he is contributing to the work of several IEEE committees; in the IEC, he is serving as Secretary of WG6 of TC77 on Electromagnetic Compatibility. His contributions to the development of voluntary standards have been acknowledged by the award of the IEEE Standards Medallion.