



### Overview

To our knowledge, very few contracts have actually been written that include clauses that specifically guarantee compliance with international power quality standards. Europe is probably the farthest along toward this, since the EN50160 standard has been officially adopted in many countries, but we assume that not many contracts have been signed that include it yet.

In North America, many utilities have been using standards, like IEEE 519, as a guideline only, but to our knowledge they not often (if ever) built this into their energy contracts with customers.

Some demand-side industries have begun to develop their own power quality standards, an example being the set of standards developed by the SEMI organization for the semiconductor fabrication industry. We are not sure how often these “demand-side” standards have actually been applied to energy contracts with energy suppliers; however, the “buyers’ market” climate being produced by deregulation might mean that contracts like this might become common in future.

### Standards

- **EN50160**  
is a new standard that covers **flicker, inter-harmonics, mains signaling, voltage deviations, and more**. The 7600 ION and corresponding PEGASYS reports make it easy to determine whether or not the power supply complies with this standard.
- **IEC 61000-4-15**  
is a flicker measurement standard that includes design specifications for flickermeters. Most digital flickermeters are based on this standard. It defines flicker perception quantities called Pst values, which are combined over 10-minute periods to produce Plt values. The standard does not set limits on these values.
- **IEC 61000-4-7**  
defined by the IEC, describes a standard measurement technique for **harmonics** and

**inter-harmonics** so that readings from different devices can be reliably compared.

- **IEC 868**  
is a report that gives functional and design specifications for **flicker**-measuring apparatus. Introduced in 1986 and intended for analog measuring devices, it has been replaced by IEC 61000-4-15.
- **IEEE 519-1992**  
is an IEEE-recommended practice. It describes acceptable **harmonics** levels at the point of common coupling between the utility and the energy consumer. If the consumer doesn't cause harmonics that exceed these levels, then the delivery of electricity should be reliable. This standard is currently in widespread use by North American utilities.
- **IEEE 1159 - 1995**  
is an IEEE-recommended practice for the **proper monitoring and interpretation of electromagnetic phenomena** that cause power quality problems. Three IEEE working groups are currently expanding the 1159 standard, focusing on the measurement (P1159.1), characterization (P1159.2), and data exchange (P1159.3) of power quality events. Note that P1159.3 is based on the EPRI/Electrotech PQDIF format.

### Organizations

- **CBEMA**  
is the Computer and Business Equipment Manufacturers Association. (CBEMA became ITI in 1994.) The CBEMA curve describes acceptable power supply operating voltages in terms of magnitude variation over time. Any voltage disturbance that falls outside the curve can cause the power supply to drop out or suffer damage. It has become a widely-accepted indication of voltage power quality.
- **ITI**  
is the Information Technology Industry Council (<http://www.itic.org>), an interest group that operates on behalf of the information technology industry. They have updated the original CBEMA curve to use straight lines that are easier to represent digitally.

- **IEEE**  
is the Institute of Electrical and Electronics Engineers (<http://www.ieee.org>). They produce standards and guidelines that cover most aspects of electricity use.
- **IEC**  
is the International Electrotechnical Commission (<http://www.iec.org>). They are an international standards and conformity assessment body that covers all fields of electrotechnology, and includes representatives from around the world.
- **SEMI**  
is Semiconductor Equipment and Materials International (<http://www.semi.org>), a global trade association that represents the semiconductor and flat panel display equipment and materials industries. They have produced a number of standards for the construction, operation, and maintenance of semiconductor fabrication facilities, including some that deal with voltage sag immunity and other power quality issues.