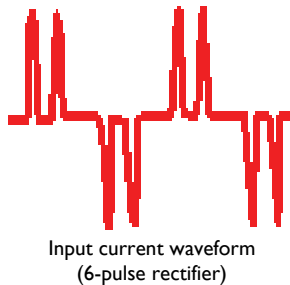


Understanding IEEE-519

By 1982, it became evident that power electronics equipment was contributing to power system voltage distortion. These energy saving products such as adjustable speed motor drives, were not drawing current in the normal continuous and sinusoidal manner, but instead were taking discontinuous gulps of current.

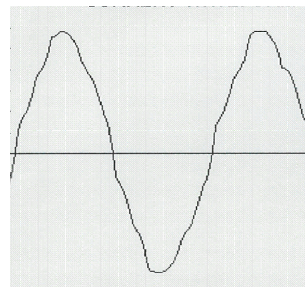
Isc / I _L	< 11	11 ≤ h < 17	17 ≤ h < 23	23 ≤ h < 35	35 ≤ h	THD-I
< 20	4.0	2.0	1.5	0.6	0.3	5%
20 < 50	7.0	3.5	2.5	1.0	0.5	8%
50 < 100	10.0	4.5	4.0	1.5	0.7	12%
100 < 1000	12.0	5.5	5.0	2.0	1.0	15%
1000 up	15.0	7.0	6.0	2.5	1.4	20%

The pulsed current waveforms contained not only the 60hz components but also multiple higher frequencies called harmonics. Effects of the distorted current included high peak current, elevated true rms current and lower total power factor. The bottom line was that although energy saving equipment was being employed, the user was not achieving the maximum energy savings due to the consumption of wasteful harmonic energy.



...ates the limits imposed by this standard based upon the ratio of available short circuit current (I_{sc}) to the maximum demand load current (I_L). This analysis is typically performed at the point where a facility power system is connected to the electric utility power system. This point is referred to as the Point of Common Coupling or Point of Common Connection (PCC).

The objective of the standard can be met by applying harmonic mitigation techniques either at the PCC or at appropriate points downstream from the PCC. Applying harmonic filters near the PCC improves the power quality for all points upstream (the utility and other facilities connected to the same utility feed. When the PCC is at the metering point, service entrance, or main transformer, the typical limits for harmonic current distortion are 5% and 8% depending on the transformer impedance and demand current.



Facility managers also noticed that the harmonics could have an ill effect on equipment life. Elevated trms current increased the I²R losses which cause increased equipment heating, reducing the life of motors and transformers. When the continuous operating temperature of this equipment is increased by only 10 degrees Celcius, it's life expectancy decreases by as much as fifty percent.

To minimize the impact of facility harmonic distortion on the utility power system and on neighboring facilities, IEEE-std-519 was developed and published in 1982. In 1992 it was updated and re-published.

This standard provides recommended limits for total harmonic voltage and current distortion as well as for individual harmonic currents. The following chart indi-

an industrial plant, the PCC is the point between the non-linear load and other loads." When the PCC is at an individual piece of equipment, the typical limits for harmonic current distortion are 8%, 12% or 15%.

Arteche offers a full range of solutions for harmonic distortion. Based on a careful analysis of facility power system and a clear understanding of the customer's objectives, they can recommend the best technical and economical solution. In many cases, the best solution involves multiple technologies connected at various points within the facility — a Hybrid solution.

Hybrid solutions can achieve IEEE-std-519 compliance in addition to maximizing the internal benefits for the customer. Rather than simply improving the power quality at the utility connection point, a hybrid solution maximizes electrical power quality within the facility. The potential internal benefits include: increased equipment life, reduced power losses, improved equipment operation, reduced equipment downtime, reduced equipment interference, and ultimately — increased productivity and operating profits.. Contact Arteche PQ, Inc. for the best economical and technical solution that meets your business and power quality objectives.