Introduction

For most of the industrial customers voltage quality conformity according to EN50160, while important as concept, has been useless due to the following reasons:

- The standard established limits for continuous voltage quality characteristics but not for discrete events like dips and swells which represent the strongest source of power quality problems in industrial utility's customers
- The absence of a clearly definition for recording information for dips and swells avoids the identification of causes and origin for these events
- 10-minute averaging intervals are clearly hiding information that have a strong impact in the users, specifically for the rms voltage
- Absence of limits for 100% of time for most of the continuous characteristics leaves an unbalance feeling in the users towards the utility
- No limits are defined for HV and EHV levels which lefts this task to national standards and/or regulations

Purpose

These comments have the following purpose in mind:

- changing EN50160 into a tool for consumers to really check voltage quality
- avoid the definition of too complex and memory demanding equipments and systems for power quality monitoring that would at the end limit their use as a common tool.
- avoid turning immediately obsolete the present measurement equipments

Comments

1. There are two objectives in voltage quality continuous characteristics measurements. The first is to verify compliance with standard limits, the second is to characterize their statistical distribution and time eventual dependency. Counting time intervals outside limits can be easily done in real time to very compliance with minimum memory spend, long time recording is the other hand essential for for statistical and dependence characterization. While shorter than 10-minute integration periods are interesting, their use would result in very demanding memory sizes that in turn could lead to very expensive monitoring systems which conflicts to their "democratization". In our opinion, as a compromising solution, the use of the already defined basic 10/12 cycle integration periods for the different variables (acc. to IEC 61000-4-30), from which all the other integration periods are derived, can be used to record, in each 10-minute interval, the extreme values for those 10/12 cycle basic measurements. The long term recording of the extreme 10/12 cycle values in each 10-minute interval provides a good image for the characteristic and can even be used for comparison with standard limits for compliance. The complexity and memory cost for such a function would have a very limited impact in most of the existing instruments and systems.
2. Limits for 100% of time must be extended to all recorded continuous voltage characteristics

3. Limits must be extended to HV and EHV levels (for harmonics and THD IEC 6100-3-6/7 recommendations should be followed)
4. Limits for the events should be introduced, mainly with the aim of dip/swell classification. For this purpose a clear separation should be made from interruption indexes accounting for energy loss, based in loss voltage x time, and severity indexes accounting for dips and swells. Our suggestion is the use of 6-9 zones over an ITIC type curve or a simpler unique index counting the number of events outside an ITIC type curve weighted by the distance to that curve.
5. RMS recording for voltage and current with ½ cycle resolution (1 cycle window, sliding each ½ cycle) should be made, including phasor symmetrical components for both voltage and current in order to have a posterior treatment trying to identify location and source for the event (upstream (external to the customer), downstream (internal to the customer), type of possible source)
6. The possibility for creating power quality zones (depending on type of grids: rural areas, industrial zones, towns) is welcome.