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Subject: Comments

Introduction

Starting from the analysis of the requirements and the recommendations issued by ERGEG and the national regulators, we agree that the present version of EN50160 must be revised, in order to remove the ambiguity of some definitions and the indicative limit values for certain voltage quality indicators.

In particular, we agree with the guidelines expressed in the ERGEG document, primarily that the power quality depends either on network operation and customer loads, so both parts, network operators and customers, share the responsibility of the power quality.

The following are some observations related to some topics referred in the ERGEG document.

Supply Voltage Variations

- **Binding limits vs. immunity levels**: the regulated binding limits for supply voltage variations must be strictly inner respect to the standardized immunity operating range of electrical equipments (e.g. binding limit ±7.5% Vn vs. operating range of equipments ±10% Vn) in order to avoid controversy or contrasts in case of borderline network conditions, where even a small (and unavoidable) voltage drop between the point of connection and the customer equipment can determine an ambiguous interpretation of an event. In such cases even a calibrator class measuring instrument could not resolve the dispute, and in any case it does not seems a sound solution to be depending only from the accuracy level of the instrument. The presence of a "dead zone" between the binding limit and the immunity range of equipments resolves the critical situations (voltage drops, instruments accuracy derating before recalibration, noise or disturbance over transducers, etc…) and sets a clear relationship between the two counterparts, improving together the overall quality of the system.

- **Range of voltage variations**: a narrower band (e.g ±7.5% Vn) respect to the actual (-15% +10% Vn) for 100% of the time can optimize the design of equipments, avoiding the oversize of power supply circuits for the normal operating conditions saving resources and manufacturing costs. Moreover, a narrower band means a more steady voltage, improving the lifetime of certain electrical loads (e.g. lamps).

- **Average time**: to ensure protection against failures or damages of electrical equipment due to supply voltage dips or swells, we believe it is not useful to regulate the supply voltage average value within a given banding limit, even if the average time is reduced to 1 minute. In fact, damages to equipments can occur due to short events, e.g. an overvoltage lasting for few seconds, but having small effect on the averaged voltage value. Therefore it seems more effective to regulate the number of events (dips and swells) already detected by proper measuring equipments instead of reducing the average time.
  The average time must be a parameter to control the supply voltage variations steadiness along the time and not the element to detect the presence of events.

  Anyway, the actual measuring equipments are already able to operate with average time shorter than 10 minutes, but it must be taken into account that reducing the average time results in an increment of data collected and the communication times.

Rapid Voltage Changes

For a more complete definition of the rapid voltage changes matter and to identify possible limit values, we suggest to characterize the rapid voltage change with the following indicators (voltage are expressed as percentage of nominal or declared voltage):

- steady-state rapid voltage change (difference from final and starting steady voltage levels)
- positive peak voltage during the rapid voltage change (value and relative time from the start of rapid change)
- negative peak voltage during the rapid voltage change (value and relative time from the start of rapid change)

The actual measuring equipments are already able to collect such parameters.

Field data from monitoring systems

In order to define voltage quality levels realistic and differentiated according to the network characteristics, it is indispensable to process the data coming from the monitoring system already operating or planned.
With regard to such processing, we believe essential to define a specification inherent to the network characteristics to relate the data with and the aggregation criteria to apply.
Examples (not exhaustive) of network characteristics are the following:

- Network type (aerial, underground, etc…)
- Network length
- Grounding type (isolated, impedance earthed, etc…)
- Short circuit power or Transformer power
- Voltage level
- Climatic and geographic characteristics
- Loads characteristics (number, power, disturbances, etc…)

Examples of aggregation criteria of power quality measurements can be retrieved visiting the website of the italian MV power quality monitoring system (http://queen.ricercadisistema.it).

Having a specified and unified system of network characteristics and aggregation criteria it is possible to make review comparing field data harmonized reports, also coming from different monitoring systems, avoiding mixtures of data not related to similar characteristics.

Moreover, it should be considerable to institute at EU level a super national body aimed to collect constantly aggregated data from the national monitoring systems in order to create a joined data bank. Such joined resource would become the source for European Regulation Groups to monitor, identify and update the voltage quality levels.