ERGEG E06-EQS-09-03

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Serial	Company	Clause/ Subclause	Paragraph Figure Table	Comments	Proposal
1.	EPRI	4.1	Para.3 Bullet 2 Subbullet 2	The question of a threshold to use for distinguishing dips and rapid voltage changes is more complicated than just choosing a number. The reference voltage must also be defined. IEC 61000-4-30 allows a floating reference voltage to be used or a fixed reference voltage. 90% is used to define an actual voltage dip but the reference voltage should also be defined. However, we cannot just count voltage dips below 90% 0 it is essential that the voltage dips be categorized according to severity in order for the indices to have any value. Also consistency in characterizing the type of voltage dip is necessary (multiphase, characteristic voltage, sag type, etc.)	Develop a more comprehensive definition of a voltage dip that includes description of performance according to severity and type of voltage dip. Coordinate with industry standards activities –IEEE 1564 and CIGRE C4.1.
2.	EPRI	4.1	Para.3 Bullet 2 Subbullet 4	This should be coordinated with the slow voltage variation characterization. For instance if slow variations are measured with one minute intervals, this also becomes a good dividing point for the durations of voltage dips. The two categories should be consistent.	Coordinate with industry standards activities – IEEE 1564, Cigre C4.1.
3.	EPRI	4.1	Para.3 Main Bullet 3	The definitions for voltage swells should be coordinated with the definitions for voltage dips. Method of characterization, durations, etc.	Coordinate with industry standards activities – IEEE 1564, Cigre C4.1.

4.	EPRI	4.1	Para.5	The duration of short interruptions should be compatible with the duration of voltage sags. If we are going to use 3 minutes here, we should use 3 minutes for voltage sags. Otherwise, 1 minute could be used for both. International definitions range from 1 minute to 5 minutes	There is not even consistency in the standards to develop a recommendation here. Using 1 minute as the criteria for short interruptions, voltage sags and voltage swells is one possibility.
5.	EPRI	4.1	Para. 6	No question that we should standardize on a way of reporting voltage sag performance (and other pq indices) that is in agreement between different entities. This does not mean that reporting is required, it just means that if you do reporting you do it in a consistent way. I also don't think that indices that AGGREGATE different power quality characteristics are useful.	Not in favor of aggregated indices associated with voltage sags.
6.	EPRI	4.2	Para.2	There is a difficulty in developing a list of exceptional events. Using the 95% of the clause approach eliminated the need to provide a long list of conditions that could result in performance outside the limits. Since the 10 minute value already provides a lot of averaging, using a limit for the 10 minute values that applies 100% of the time should be possible. If this is done, we must be careful to use the same approach as flicker where actual disturbances are excluded from the 10 minute periods that are considered.	Consider limits that apply 100% of the time with appropriate exclusions of disturbance events.
7.	EPRI	4.4	Para 1	There should not be limits for interruptions, voltage dips, or other EVENTS. However, recommendations for reporting historical performance and providing "EXPECTED" performance for individual locations is advisable. This can be used by end users in performing economic assessments of power conditioning needs. Also, supply companies should strive to resolve particular problems with system performance where these problems affect end users (this is the South African approach).	Do not include limits for disturbance categories, such as voltage sags. Propose reporting of indicative levels and utilities should have the capability to describe expected performance for individual sites.

8.	EPRI	4.5	Para.2	It would be good to provide an immunity curve defining a recommended dividing line where equipment should be immune and the performance of the system shouldn't be a factor. However, we shouldn't regulate the performance for events that are outside this curve. We should just have reporting of EXPECTED performance outside the curve. IEC 61000-4-11 and 61000-4-34 provide examples. Note that it will be important to define sag types as part of this definition as well (three phase sags are not the same as one phase sags)	Propose an immunity curve that defines recommended equipment immunity and this provides a possible index for describing system performance (number of events outside of this curve for different types of sags). However, this index should not be a regulated limit but a way of describing expected performance.

9.	EPRI	4.6	Para.2	These factors mainly affect reliability and voltage sag performance. These system characteristics should not affect minimum requirements for steady state voltage quality that all systems should be able to meet. We are a long way from having limits for interruptions and voltage sags that are system dependent although this conceivable could be a long term goal.	Do not impose specific limits for voltage sag performance that are based on system characteristics – these factors are not well enough understand yet to come up with reasonable requirements.
10.	EPRI	5.2	overall	Note that limits for many types of voltage quality variations are good to specify but it is not necessarily economical to require demonstration of compliance at all or a percentage of locations. Use of the guidelines as a method for resolving customer problems is another approach that can be very effective at much lower cost to society overall since the number of cases where there are problems is relatively small.	Be careful about creating requirements that include expensive procedures for compliance verification. The limits can be specified as a way to resolve complaints and they will have much the same value.

11.	EPRI	7.0	Item b	Various unusual conditions (dynamic overvoltages, ferroresonance, fault conditions) can cause short duration overvoltages that may damage equipment. Without more detailed information, we generally recommend that equipment overvoltage withstand characteristics be coordinated with the overvoltage vs time capability of MOV arresters. In other words, an arrester should fail before the equipment. There can be benefits in terms of loss reduction of tighter voltage control, especially as a way of allowing conservation voltage reduction to be implemented. However, this is not likely to be sufficient justification for stricter voltage control. Year-by-year variations - The issues are exactly the same as developing limits for interruptions. System level goals can be implemented but limits for individual locations are not realistic. Even system limits should be adjusted for annual conditions that have important impacts on performance (e.g. lightning levels). Contracts - There will very seldom be any economic reason for power quality contracts in any area except voltage sags and interruptions. Minimum requirements in the areas of all steady state PQ conditions are sufficient for virtually all customers. Contracts related to reducing the number of voltage sags or interruptions would be a case by case condition where the supplying utility could provide an option to investments within a facility for equipment protection from interruptions and voltage sags.	No change to EN50160

12.	EPRI	7.0	Item c	I believe that minimum requirements for steady state PQ levels (voltage regulation, harmonics, unbalance, flicker) should be uniform around the world because this provides the basis for equipment manufacturers to design equipment immunity. Voltage sags and interruption performance should be specified in terms of procedures and indices for characterizing performance. Limits are not needed and can be uneconomic. Setting general goals as a function of system characteristics couldbe applied for an index like faults/circuit km. These should be carefully evaluated in terms of costs to accomplish them and the effect of system characteristics. Not a simple task. Reporting of performance at substation level makes sense to me. This gives most customers the information needed to make economic decisions.	