

**IEEE PES Voltage Quality Working Group
Face-Face Meeting Minutes
January 18, 2006, 1300-1630 Pacific Time, Las Vegas, NV**

Attendees:

1. Reuben Burch, Alabama Power
2. Gary Chang, National Chung Cheng University
3. Randy Collins, Clemson University
4. Russ Ehrlich, Pepco Holdings, Inc., **WG Vice-Chair**
5. Tom Gentile, National Grid
6. Erich Gunther, Enernex
7. Mark Halpin, Auburn University
8. Dennis Hansen, Pacificorp, **WG Chair**
9. Fred Hensley, Megger, **WG Secretary**
10. John Kennedy, Georgia Power
11. Scott Lacy, Southern California Edison
12. Mark McGranaghan, EPRI-Solutions
13. Dave Mueller, Electrotek
14. Marty Page, Georgia Power
15. Daniel Sabin, EPRI Solutions
16. James Wikston, Hatch

Fred reviewed the minutes from 26th October teleconference, which were approved by the working group attendees.

Dennis H. handed out copies of the agenda, the previous minutes from the 26 October conference call, and a suggested outline approach for revising 1250.

Mark M. to provide documentation for the following reference documents which to be sent out to attendees:

1. Applicable IEC Standards
2. Voltage sag document done for the UK. Available in the public domain – Voltage sag reference document.

Russ E. Report on PAR:

1. PAR title has been updated to read as, *“IEEE Guide for Identifying and Improving Voltage Quality in Power Delivery Systems”*,
2. There was a request to distribute another copy of the latest PAR document.
3. The IEEE response on November 21st indicated we must wait until February for PAR approval.
4. The latest scope moves from the electrical environment into the power delivery system.
5. IEEE 1250 is to be the “Gateway” for introducing power quality, with references to other applicable documents.
6. Russ E. will create a line numbered version of the 1250 document to facilitate easier group edits.

There will be a panel session regarding the current IEEE 1250 at the T&D in May.

Mark Halpin pointed out that any requests for clarification from the New Standards Committee (NESCOM) must be responded to immediately to avoid being tagged as non-responsive.

Randy C. suggested ensuring that replies to NESCOM always go to the person making the comment, with a copy to Jody.

Dennis H. reviewed the PAR application document with everyone. Several small changes were made from group input.

Dennis H. reviewed the outline and overview of the existing 1250 document.

1. Table 1 – Suggested getting rid of the last column to remove possible confusion and contention
2. Some of the material from current 1250 has since been incorporated into the latest 1453 and 519 standards documents.
3. Table 4 is the “meat” of where we wish to go with the revised 1250
4. Table 5 – Do we keep this or not?
5. The bibliography contains many standards and paper references.

The new IEEE style guide trumps existing formatting. There was some formatting and content discussion regarding the new usages of the definitions and glossary sections.

A “Starting point” 1250 outline was presented by Dennis H., which included:

1. *Overview*
2. *References (standards only)*
3. *The Power Delivery System*
 - a. *Basic Description*
 - b. *Define Delivery vs. Use*
4. *Identifying Voltage Quality in Power Delivery Systems*
 - a. *Key Performance Attributes and Key Performance Indicators for PD Systems*
 - b. *Typical Voltage Quality Levels*
5. *Improving Voltage Quality in Power Delivery Systems*
 - a. *Electromagnetic compatibility test (disturbance vs. immunity)*
 - b. *Loads that might be sensitive*
 - c. *Utility side solutions*
 - d. *Customer side solutions (very brief with references)*
6. *Glossary*
7. *Bibliography*

There was discussion on these elements as follows:

1. A request was made to include a separate section on sensitive loads. A decision was made to include it as a separate section under “Identifying VQ in PDS”
2. A suggestion was made to incorporate an introduction to probability distribution maps, similar to the corresponding IEC concept.
3. A suggestion was made to incorporate a section on the relative economics of power quality solutions.
4. There was a suggestion to provide a larger customer side solutions section so that it provides balance to the utility side solutions.
5. There was a suggestion under the basic description system, extend the definition of the PD system to include the “Utility” PDS and the “Customer” PDS, thereby emphasizing the PCC. To do so we may create a “delivery” versus “utilization” terminology. The end result decided was to drop the term “Delivery” from the PAR, changing the “Power Delivery System” to the “Power System”. Therefore the PAR scope will drop all references to the word “Delivery”.
6. There will be a new bullet added to the proposed new outline which emphasizes the PCC.

As a result of the discussion, the new outline will include the following clauses:

- 1. Overview**
- 2. References (standards only)**
- 3. The Power System**
 - a. Delivery**
 - b. Utilization**
 - b. Point of Common Coupling**
- 4. Identifying Voltage Quality in Power Systems**
 - a. Key Performance Attributes and Key Performance Indicators**
 - b. Benchmarking (Typical VQ levels)**
- 5. Load Sensitivity**
 - a. Electromagnetic compatibility (EMC) testing (disturbance vs. immunity)**
 - b. Discuss Load Sensitivity**
- 6. Improving Voltage Quality**
 - d. Utility Side Solutions**
 - b. Customer Side Solutions**
- 7. Glossary**
- 8. Bibliography**

The newly revised PAR scope will read as follows:

The reader of this guide will find brief discussions of ways to identify and improve voltage quality in power systems, and references publications in this area.”

More specifically, this guide includes:

- 1. Voltage quality levels from benchmarking studies**
- 2. Factors that affect power system performance.**
- 3. Mitigation measures that improve power system performance.**
- 4. References to current relevant**

This Guide only treats subjects in depth where no other power quality reference does so. Hence, it is also a “gateway” document for power quality which points the way to other documents in this field.

Randy C. suggested the 1250 also include discussion on the transmission side.

The revised PAR purpose will delete the word “*delivery*” from the first sentence. The second sentence will read as follows: ***“Additionally, this guide will assist utility system customers in finding better compatibility between the quality of voltage provided and needs of their electrical equipment.”***

The following people have volunteered to chair the following clauses:

- a. John K. and Marty P. – Clause 3 (The Power System)
- b. Mark M. and Dan S. – Clause 4 (Identifying Voltage Quality in Power Systems)
- Scott Lacy to add PQ Slang text
- c. Randy Collins and James Wikston - Clause 5 (Load Sensitivity)
- d. Math Bollen and Mark Stephens as CIGRE C4.10 support for Clause 5.
- e. Dave Mueller and Russ Ehrlich – Clause 6 (Improving Voltage Quality in Power)

John K. will chair the Clause 3 group.

Mark M. will chair the Clause 4 group

Randy C. will chair the Clause 5 group

Dave M. is “tentatively” set as chair for Clause 6 (Russ E. to confirm)

Randy suggested identifying a clause chairman to take over the synchronization of the References section. This idea was accepted, and Reuben B. will be the clause chairman for this section.

Next there was a discussion as follows regarding what stays and goes from the original document:

1. Remove the Terminology Differences section.
2. Add a point to Clause 4 which admonishes against use of references to slang such as “Spike” and “Bump” and “Voltage Flicker.” Scott Lacy will provide the list and write-up language for Mark M.

3. In Clause 4, remove references to “Steady State”. Substitute “Continuous Phenomena” such as RMS voltage level/range, unbalance, distortion harmonics/interharmonics/notching, and fluctuations. Under disturbances section include transients, sags/swells, momentary interruptions, and outages.
4. Put gateway reference citations to other standards in square brackets at the beginning or end of each section or clause.
5. How to include a graphical chart of unbalance. Mark M. will discuss the various methods of computing unbalance (i.e. negative sequence, zero sequence). Show a visual representation of the symmetrical components and reference an applicable textbook.
6. A graphical representation of interharmonics via a histogram, and of Notching via a waveform.
7. Remove the GE Flicker curve. Put in a motor start rms voltage diagram.
8. Under disturbances include as subsets both switching (line and capacitor) and lightning.
9. Keep the elements pertaining to faults, motor starting, etc.
10. Replace tables from 519 with benchmarking data. Discuss voltage distortion characteristics and limitations, but remove all references to current distortion.
11. In the “Sensitive Loads” clause, update the charts with the latest CBEMA, ITIC, and SEMI F47 charts. Put the CBEMA curve separately, and overlay ITIC and SEMI F47 on the same page. There should be a discussion on what loads are applicable to which curves, and reference IEEE 1346 on qualifying the weakest link and any applicable economics of that qualification...
12. In the “Solutions” section, use the table as a starting point. Reference and utilize applicable elements from IEEE 1409.

As a target length, each clause should be approximately 5-6 pages each. Some may be shorter, others slightly longer, with the whole document target to 30 pages total. The benchmarking section (Identifying VQ) will likely be longer. This is OK as it is what will likely offer the most important contribution of 1250.

The meeting was adjourned at approximately 4:15 pm. The next web call will take place on Wednesday, April 12th, from 1:00 – 3:00 PM Eastern Time, 10:00 AM -12:00 Noon Pacific.

Action Items:

1. Russ E. to create line numbered version
2. Fred H. to help facilitate web site creation and administration by chair, co-chair, and secretary.
3. Dennis H. to update PAR with latest input from this meeting and resubmit before official IEEE review next month
4. Russ E. cut and paste current 1250 text into an editable format for Clause Chairs by the end of February.
5. Scott Lacy to provide Mark M. with list and write-up concerning unacceptable PQ slang terms.
6. Fred H. to produce and distribute meeting minutes.
7. Dennis H. to send out invitations for the upcoming electronic meeting in April.