

**K: SUBSTATION PROTECTION SUBCOMMITTEE**

**Chair: P.G. Mysore**

**Vice Chair: M. J. Thompson**

The K-Subcommittee met on Wednesday, January 11, 2012 in Garden Grove, CA, with 21 members and 37 guests in attendance. A quorum was achieved to approve the minutes of the September 2011 subcommittee meeting.

One new member joined the K subcommittee: Gene Henneberg. The committee membership presently stands at 32 members.

The following Task Forces were elevated to Working Groups starting at the January 2012 Meeting: KTF1 has become WG K1.

**Reports from the WG Chairs**

**K1: GUIDE FOR THE APPLICATION OF PROTECTIVE RELAYING FOR PHASE SHIFTING TRANSFORMERS.**

**Chair: Arvind Chaudhary**

**Vice Chair: Lubomir Sevov**

**Established: Sept. 2011**

**Output: Guide for the Application of Protective Relaying for Phase Shifting Transformers**

**Expected Completion Date: Sept.2015**

**Assignment: To write a guide for the application of Protective Relaying for Phase Shifting Transformers (PSTs). The protection methods for different types of PST and operating conditions of PSTs will be reviewed. Representation of PST models to determine short circuit currents for relaying considerations will be considered. Protection CT sizing and location issues will be considered. Relay application and setting examples will be provided.**

The K1 working group met for a single session on January 9, 2012 at 8:00 am with a total of 18 attendees. Attendees included 11 WG members and 7 guests present. Lubo Sevov had an excused absence.

- The K1 WG meeting started with introduction of the attendees and review and approval of the meeting notes from the K1 WG meeting in Minneapolis, MN in September, 2012.
- Eli Pajuelo reported on the types of PSTs that are not mentioned in C57.135. There are four other types of PSTs not mentioned in C57.135 which shall be listed in the Annex of the Guide for completeness.
- Eli Pajuelo provided a list of references on PSTs.
- Electrocon (EII) software CAPE has capability to model PSTs in their short circuit program. The details of modeling capability of CAPE will be shared with the WG Members upon obtaining permission from EII.
- Michael Thompson volunteered to discuss PST modeling capability of RTDS equipment.
- Arvind Chaudhary submitted the PAR on January 17, 2012 after the meeting. The PSRC officers granted an extension beyond the required 6 months between starting the working group and submitting the PAR.

- All WG members actively discussed the details of the data required to calculate short circuit currents in the PST to determine relay settings. This data will be covered in a Separate Annex of the Guide. Arvind Chaudhary referenced that testing of PSTs is covered in C53.12.90 Clause 11.2, "Special Tests for PSTs".
- All members of the WG also participated in improving the first draft outline of the Guide. Arvind and Lubo to take action and add individual subsections to the outline and distribute it to the Members of the WG for comments by February 15<sup>th</sup>, 2012.
- For the May 2012 meeting the following WG members volunteered to present: Dean Miller and Eli Pajuelo "Tutorial on the Different Types of PSTs"; Michael Thompson on "Protection of Extended Delta PSTs"; David Bisel on "Conventional PST protection design".

**K3: REDUCING OUTAGES IN TRANSMISSION SUBSTATIONS**

**(subtitle: Reducing Outages Through Improved Protection, Monitoring, Diagnostics, And Auto restoration In Transmission Substations)**

**Chair: Bruce Pickett**

**Vice Chair: Paul Elkin**

**Established: 2010.**

**Output: Papers – 1. Full Paper Report to the Sub Committee and Main Committee, and 2. Summary Transactions Paper**

**Draft 3.2; Transactions Summary paper 0**

**Expected Completion date: 2013**

**Assignment: To prepare a paper or a report on protection methods that reduce outage durations in substations with auto-restoration and communication techniques.**

Meeting was called to order January 11, 2012 with 6 members and 8 guests

Introductions were done and previous minutes were discussed.

We reviewed draft-3.1 of the paper.

Reiterated that any specific topics that were fully covered in the D2-WG for the C37-104 Reclosing Guide would not be covered in any detail in this paper.

We reviewed the current draft, and made additional changes and writing assignments.

**K4: (PC 37.95.2002): GUIDE FOR PROTECTION CONSUMER UTILITY INTERFACE**

**Chairman: Mukesh Nagpal**

**Vice Chair: Chuck Mozina**

**Established: 2008**

**Output: Guide Revision**

**Draft 6**

**Expected Completion Date: 2012**

**Assignment: To revise C37.95-2002 (R2007) – Guide for Protective relaying of Utility-Consumer Interconnections**

The working group met in double session on Tuesday January 10, with 9 members and 11 guests present. A quorum was not present.

After introductions the IEEE Patent Slides were shown.

The chairman presented the minutes from the September, 2011 meeting and updated the WG on status of the revisions to C37.95.

Review of progress on passed assignment.

Section 7.3 A drawing was added to help explain consumer generator separation options for utility supply faults where the customer is not exporting power to the utility. Minor changes will be made to labeling of circuit breakers in the drawing.

Section 7&8 Drawing in this section was completed in Visio and revisions made in both the write-up and within the drawings to reflect discussions held at the September 2011 WG meeting. These sections address consumers with generation.

Section 8 Breaker failure was added to the interconnection transformer secondary breaker at consumer facilities where fault current can be supplied to utility system faults either through a parallel source or consumer's generation.

The bulk of the WG meeting was devoted to reviewing the changes to Section 7 & 8. Major changes were made in this section which included:

- Adding the word "Typical" to the figures 12 -17 which shown examples of interconnection relay protection.
- Transfer Trip will be added to all cases when there is a source of fault current contribution to utility faults either through a parallel source or consumer's generation.
- Reasons for the removal of the 51N relay on the low voltage breaker of the consumer interconnection transformer were discussed and why this relay is not generally applied at consumer installation where the fault current are limited by a neutral grounding resistor.
- Figure 12b will be changed by Chuck Mozina to reflect this removal.
- Voltage rating requirements for the potential transformers used in broken delta connections were clarified in Section 8.4.4
- Consumer bus and feeder protection will be retained in the document since written description of typical protection are already in the document and provided a more complete description the protection that is generally installed.

Other sections of the document were also reviewed and resulted in the following changes:

- Section 5.2.4.1 The description of current supervision of sudden pressure relays was removed from the document. A sentence was added about the limitation of fuses to provide adequate consumer transformer low-voltage protection where current is limited by a neutral grounding resistor.
- Section 4.3 The discussion of arc-flash was removed as not relevant to the document.
- Figures 1-9 were reviewed and proposed changes were identified to the sketches in draft 6 of the document.

Assignments:

The Chair will provide a 7.1 draft of the document reflecting changes made during the meeting to key WG members.

Figures 1-9 – Steve Conrad and Jeff Barsch will provide Visio drawing for Fig. 1-9 and incorporate changes discussed at the meeting concerning “Point of Interconnection”

Figure 12 Dean Miller will re-label breakers in the drawing and refer to them in the written description within the text.

Figure 12b -- Chuck Mozina will remove 51N relay and incorporate changes in Section 7 & 8 discussed at the meeting.

The above assignments are due to the chairmen by Feb. 15.

The entire draft with the above changes will be reviewed by Ken Behrendt and Moh Sachdev.

**K5: (PC 37.119.2005): IEEE Guide for Breaker Failure Protection of Power Circuit Breakers**

**Chairman: Roger Whittaker**

**Vice Chair: Adi Mulawarman**

**Established: 2011**

**Output: Revised Guide**

**Draft : None**

**Expected Completion Date: To Be Determined.**

**Assignment: To revise and update C37.119-2005 – IEEE Guide for Breaker Failure Protection of Power Circuit Breakers.**

The working group met on Wednesday, January 11th 2012. We had 34 attendees with 17 members and 17 guests present. The working group has 33 members so far.

The chair submitted the PAR application on January 2nd, 2012. No words back on whether it has been approved. After it has been approved, we plan to have schedules/milestones.

The WG members discussed the next action plan. We reviewed existing sections and volunteered to review the sections. No due date was given because the PAR has not been officially approved yet.

There was discussion about how the group plans to go about revising the document. The idea about adding new sections was discussed. It was decided that review of existing sections will occur concurrent with the decision making process and writing of approved new sections.

A comment was made that, although it is considered backup protection, a breaker failure scheme is the only main protection of the power circuit breaker itself when the breaker fails.

Roger Whittaker presented a scheme describing a method to automatically isolate a failed power circuit breaker. Also a breaker differential scheme was described.

The vice chair will follow up with Erin Spiewak on getting the IEEE Mentor website setup for posting the existing standard document. The chair will see about getting the word document that can be edited.

The reaffirmation comments will be posted in the K5 PSRC website.

**K6: SUDDEN PRESSURE PROTECTION FOR TRANSFORMERS**

**Chair: Randy Crellin**

**Vice Chair: Don Lukach**

**Established: May 2005**

**Output: Report**

**Expected Completion Date: January 2011**

**Draft 6.0**

**Assignment: To complete a technical report to the Substation Protection subcommittee on the application of sudden pressure relaying in power transformers.**

The working group met on Tuesday, January 10, 2012, in a single session with 9 members and 3 guests.

The meeting notes from the September 2011 meeting held in Minneapolis, MN were reviewed and approved without modification.

After introductions and a brief review of the working group progress to date, the group reviewed three assignments that were submitted since the last meeting. An introduction for the report and a section on turn-to-turn fault detection using sensitive negative-sequence differential elements were accepted without revision and will be incorporated into the report. An overview of the survey was also reviewed and portions of this document will be incorporated into the report.

The group reviewed draft 1.0 of the report and decided to make the following revisions:

- Move the section "A History of Transformer Pressure Relay Applications" to Appendix A
- Add the detailed survey results to Appendix B
- Move the section "Secondary Pressure Chamber Issues" to Appendix A (incorporate into the history information)

The WG chair and vice-chair will work to make these changes by the end January 2012 and forward draft 2.0 of the report to the working group members.

Don Ware offered to provide a section covering testing and maintenance aspects of sudden pressure relay systems. This will be provided by April 1, 2012.

Working group members volunteered to review draft 2.0 of the report and incorporate specific portions of the survey result summary information into the report:

- SPR Application – Charlie Sufana
- SPR Trip/Alarm – Pat Carroll
- SPR Types – Rafael Garcia
- SPR Maintenance – Arvin Chaudhary
- SPR Diagnostics – Mark Teetsel
- SPR Operation – Greg Sessler

All working group member assignments are due to the chair by April 1, 2012.

**K8: GUIDE FOR THE PROTECTION OF SHUNT CAPACITORS**

**Chair: Pratap Mysore**

**Vice Chair: Ilia Voloh**

**Established, 2006**

**Output: Revision of IEEE C37.99-2000**

**Expected Completion date: 2011**

**Status: Draft ??**

**Assignment: Revise and update C37.99-2000 "Guide for the Protection of Shunt Capacitor Banks."**

The Working group, K8, met on Jan 10, 2012 in one session with seven members and two guests in attendance.

The chair informed the group that the balloting of draft 6 was completed in December 2011 and ballot comments were received.

The results of the ballot are:- Return rate of Ballots -76% ( just scraped through the 75% requirement); 387 comments received, 313 editorial, 64 technical comments; Approval 91%; Number of negative ballots -8. Most of the editorial comments were due to PDF conversion problem that resulted in words with overlapping letters

Teleconference and WebEx will be set up by the vice-chair, Ilia Voloh to address technical comments.

The chair proposed to use the mentor site to post revisions in the future. The recirculation is expected to be completed before the May meeting.

**K10: SCC21 DISTRIBUTED RESOURCES STANDARD COORDINATION**

**Chair: Gerald Johnson**

**Vice Chair: TBA**

**Established, 1999**

**Output: Standard through the SCC 21**

**Expected Completion Date: 20xx**

**Assignment: To interface with SCC21/P1547 in order to reduce unnecessary delays by getting PSRC input into the process without having to wait for after-the-fact coordination.**

Working group K10 met on Tuesday, January 10, 2012 in Garden Grove CA, with 4 members and 7 guests in attendance. IEEE/1547.x working group activities were reviewed.

Draft 6.0 of IEEE P1547.7 "Draft Guide to Conducting Distribution Impact Studies for Distributed Resource Interconnection" was posted on 12-12-11 with a target of having comments back to the chair Bob Saint by 1-7-12. Comments will be discussed at the 2-12 1547 meeting and the plan is to have a ballot ready document after this meeting.

IEEE P1547.8 "Recommended Practice for Establishing Methods and Procedures that Provide Supplemental Support for Implementation Strategies for Expanded Use of IEEE Standard 1547" is ongoing. I am involved with the committee working on Protective Relaying Best Practices which is presently planned to appear in Appendix C of the final document. Six phone meetings were held in the last 3 months working on the development of this section.

The floor was opened to members and guests for discussion wind, solar, and battery storage facilities/jobs going on in their areas. There was an excellent exchange from our guests and members. If anyone needs passwords for the working groups send me an email.

The next 1547 meeting is in Atlanta the week of 2-6-12.

**KTF4: JOINT TASK FORCE T & D CAPACITOR SUB-COMMITTEE, K13 SERIES  
CAPACITORS**

**Chair: Simon Chano**

**Vice Chair: Mark Mcvey**

**Established: October 2009**

**Output:** jointly prepare a PAR to issue a corrigendum to the guide.

**Expected Completion Date: TBA**

***Assignment: Coordinate PSRC standards activity with Capacitor Subcommittee***

KTF4 did not meet at this meeting.

**Liaison Reports:**

IAS Arc Flash - Chuck Mozina reported IEEE 1584 –Guide for performing arc flash hazard calculations is revised. He will pass on the details as soon as they are available.

Capacitor Subcommittee-

- Clause 8.3 on testing of MOV in the IEEE guide C37.116 on series capacitor protection was reviewed by Capacitor subcommittee and Surge protector subcommittee chairs. The working group is waiting for input from the Capacitor Subcommittee. They have solicited input from the manufacturers on their recommendations for series capacitor installations.
- IEEE 18 is under revision
- A paper on “Inductor applications for capacitor switching technologies” is worked on as a joint switchgear committee and capacitor subcommittee output.

**Old Business:**

C37.109, IEEE Guide for the Protection of Shunt Reactors has completed ballot for reaffirmation. There were no negative ballots. The document has been submitted to REVCOM for reaffirmation.

**New Business:**

Adi Mulawaraman has agreed to be the new web master for the K subcommittee. Charlie Sufana has served as the web master for several years. We thank Charlie for his years of service.

IEEE PES Substation committee: There is a new WG I9 - IEEE Recommended Practice of a Modern Protection System for Static Var Compensators Chaired by M. Halonen. The document will cover protection aspects integrated with controls in SVC. Pratap met with the working group at the joint meeting this week and informed them of the various PSRC guides that are in existence so that they could make sure that they only write on topics outside of existing guides and reference the appropriate documents as required.

Steve Conrad asked the group if anyone has seen new circuit breakers with the CTs mounted with the polarity opposite to what was shown on the nameplate diagram. They have had a number of breakers with this problem from one manufacturer. No one else had seen this problem. Steve cautioned everyone to make sure that they perform polarity tests on new equipment so that they will find this type of error should it occur.