

**Capacitor Subcommittee  
of the  
Transmission and Distribution Committee  
2016 IEEE PES Joint Technical Committee Minutes  
Memphis, TN**

**Wednesday, January 14th, 2016**

**I. Introduction**

The meeting was called to order by the Subcommittee Chairman Richard Sévigny.

Attendees introduced themselves. The following 17 people were in attendance:

<u>Name</u>	<u>Company</u>	<u>Member or Guest</u>
Bill Chai	GE - CPQP	Member
Biswajit Singh	ABB Inc.	Member
Dan Luke	Eaton-Cooper Power Systems	Member
Frédéric St-Hilaire	Hydro-Québec	Secretary
*Gerald Winstanley	NEMA	Guest
Halim Malaj	ConEd	Member
Jan Paramalingam	Mitsubishi Electric	Member
Joe Meisner	AEP	Member
Marc McVey	Dominion	Member
Mike Hulse	Bonneville Power	Vice Chairman
*Mike George	AEP	Member
Paul Marken	GE Grid Solutions	Member
Richard Sévigny	Hydro-Québec	Chairman
*Roberto Gonzalez-Ramos	Pacific Gas & Electric	Member
Roy Alexander	RWA Engineering LLC	Member
Tom Grebe	EnerNex	Webmaster
Vincent Deslauriers	ABB Inc.	Member

\* New Member or Guest, Welcome!

**II. Previous Meeting Minutes**

The minutes from the July 2015 Denver PESGM were reviewed. Minutes were unanimously approved as submitted by a motion from Joe Meisner that was seconded by Marc McVey.

**III. Membership Review**

Membership roster was sent around for review and correction.

There are currently 17 attendees in the subcommittee meeting,

- Membership roster can be found at: <http://grouper.ieee.org/groups/td/cap/>

This subcommittee is open to new members and guests.

#### **IV. Chairman's Report**

The group has been very active. Started new working groups and task forces. A par was started for the filter application guide mainly due to the deadline of 2018. New low voltage shunt capacitors application task force was started. In the future, it will be attached to Standard 18. Unfortunately the chairman could not attend the meeting so the work was postponed to the next meeting. A new task force was started for the application guide 1036 regarding the capacitor discharge. A request was received by various working groups to extend the duration of their sessions during the next meeting. The group is considering 2 options: adding an extra day or having parallel sessions. During the last IEEE T&D meeting in Denver, the T&D committee requested to receive the Capacitor Subcommittee minutes and member list at least once a year. Concerning the renumbering of the IEEE capacitors standards discussion proposition, if the group decides to take that route, the subcommittee will have to go thru hearings in the T&D committee. The 1036 application guide was discussed regarding the IEC who asked to use the document. Nothing have been coming back from by the IEC. Unless something comes back from the next IEC meeting, it will now considered a dead subject. No further actions will be taken from the capacitor group. A par for the filter application guide has been discussed in perspective to the deadline of year 2018 coming up. The rule being that any document that have been approved before 2008 have to be done again before 2018 otherwise it will become a dead body.

#### **V. Liaison Reports**

##### **A. NEMA – Bill Chai**

The group had the pleasure to receive the visit of the general manager of NEMA Mr Gerald Winstanley. Last meeting was in April and there was no meeting since then. During the next meeting in spring the group will try to discuss the test proposed by Richard Sévigny and the discharge tests performed by Roy Alexander.

##### **B. IEC, CIGRÉ**

###### **IEC – Bill Chai**

TC33 next meeting will be tentatively in Italy sometimes in October or November 2016. The Italian national committee agreed to host the plenary meeting. Should receive a formal invitation no later than May to respect the 6 month minimum delay prior to the event. Concerning the activity, there is a new chairman. Unfortunately, she could not attend the last meeting. Lots of activity from various working groups, some concerning the dry type self-healing technology in MV and HV. IEC agreed to set up an investigation project in order to get enough persons interested to participate in a working group. Concerning the request from IEC to use the IEEE Application Guide 1036, no information about who will be responsible for that and who will

participate in the working group. The members have mentioned that the guide is well respected by the IEC. They are definitely interested to have a look to see what could be shared.

### **CIGRÉ – Marc McVey**

The C4/B5.41 working group is focused on “Challenges with series compensation application in power systems when overcompensating lines.” The working group met twice in 2015, 1<sup>st</sup> time in May and the 2<sup>nd</sup> time in November. Paul Marken is the secretary. The working group is going well, there is a nice mix of type of people participating. The group has outlined a document and assigned tasks to members based on their field of expertise. It will be a mix a simulations and definitions. The goal is to show people that it’s not something they should be worried about. They will list the types of known problems that exist and will explain their respective forms of mitigation. Applications, mitigations and things to know for specification will be in the document. Marc went to the 2<sup>nd</sup> meeting hosted at the GE office in Schenectady NY and Paul attended the first meeting in Lund, Sweden. The next meeting is scheduled for April in Helsinki, Finland.

The other working group is on UHV series capacitors banks currently used by China. They are leading the way in the current developments using that voltage level. There is an interest from Bill Chai and Marc McVey to participate in that working group.

## **VI. Working Group Reports**

### **A. Working Group on Capacitor Technical Papers – Tom Grebe**

Three papers were reviewed during the past year. Two were accepted with their revisions and one was rejected. The papers on “Capacitor Switching Transient Immunity of Inverter Based Renewable Generation” and “Resonance Free Shunt Capacitor Configurations Design Methods and Comparative Analysis” will be published at a poster session or during the summer general meeting. The rejected paper was “Criteria for Unbalanced Current Protection of High Voltage Filter Banks”.

### **B. Working Group on Capacitor Bibliography – Richard Sévigny**

The working group have managed to incorporate in the bibliography the paper lead by Roy Alexander “Transient Emitting Vectors Applications of Shunt Capacitor Banks”. Also, the paper from Aharon Kalyuzhny “System Approach to Shunt Capacitor Location in a Radial Distribution System” was added.

### **C. Working Group on Guide for Application and Specification of Harmonic Filters - Jan Paramalingam**

A par is submitted and now waiting for approval by March 22<sup>nd</sup>. The plan is to issue out the draft specification for review no later than the next January meeting in 2017 and begin balloting in July 2018. There is a general request to all members to review the draft standard and to also seek out low voltage filters manufacturers and subject experts to review specific sections because most of the group is HV focused. Jan has also taken an action item to do liaison with the IEEE Power Quality subcommittee because they are also working on a revision of Standard 519. They have a

task force and a working group for the revision of Standard 519. Since the guide 1531 will probably be finished first, Jan will give them the opportunity to review and comment the technical content to prevent any conflicting information between the two documents.

#### **D. Task Force on Shunt Capacitors – Paul Marken**

20 people attended this meeting including 18 members and 2 visitors. Possible changes in the next revision of Standard 18 were discussed. This included some passionate discussions of what should be included or not. Paul believes it is now appropriate to submit the par and to begin working on the next revision. Some wording describing a possible new test was suggested by Richard Sévigny. Roy Alexander presented the result of his work on capacitor discharge, with some suggestions on how the standard could be changed to reflect more realistic discharge requirements.

#### **E. Task force on LV Shunt Capacitors – Peter Goldstrass**

The chairman apologizes for not being able to make it. The meeting was cancel.

#### **F. Working Group on Series Capacitor – Marc McVey**

15 people attended. Now the par is approved for revision of standard 824. Some suggested revisions that will occur next time. Paul Marken went thru the review of the negatives that we had from the last reaffirmation of standard 824 as a basis of things that need to be looked at as a working group in order to see if it is still relevant to make a change to the standard. A good working list in a spreadsheet form will be used for the next meeting. Paul and Mark met the members of Standard C37-116 WG-K13 and looked at, from an organizational point of view, the portion in Standard 824 section 6.1 “Suggested protective functions”. The WG-K13 had used that section text in the past. They will remove it and will add definitions and provide examples that Standard 824 can reference to afterward. The big question is: who’s going to finish first. C37-116 needs to finish first so that Standard 824 can refer to a new section that actually exists. The relations with WG-K13 have improved. There is a good working relationship going on with the new people and a new chair on the C37-116 committee. Marc reviewed the previous document of C37-116 from a “series capacitors” perspective in order to highlight the previous suggested changes and problematic sections. The comments have been well received and understood. Will monitor the list of changes once C37-116 start balloting the document. No information is available regarding when the balloting will start.

#### **G. Working Group on the Application Guide for Shunt Power Capacitors – Joe Meisner**

20 people attended. Marc presented some of his proposals for the surge arresters guide, a presentation on what could be done to protect capacitors with surge arresters and some sizing techniques that will be included in the guide. Had some discussions about what could be added to the application guide. Halim has submitted guidance on specifying voltage ratings of capacitor banks. Discussed the wording in the considerations about the ratings of the guide in general. Hoping to ballot after next meeting it in order to respect the 2018 par expiration date. There is

still time for more good submissions before the next meeting. Roy Alexander discussed his tests and thoughts on the capacitor discharge subject that could be put in the guide.

#### **H. Task Force on Capacitor Geomagnetic Disturbances (GMD) Mitigation – Marc McVey**

20 people attended. The group covered the first application paper written. Will be submitted as a transaction paper or a conference paper. Not sure how it will fit into the timing of things. Two new contributors for reviewing the paper. The comments and suggestions will be integrated into the paper. A second paper has been discussed. The outline is completed and the group discussed many aspects of it. A new IEEE Magazine on GMD that came out in December. It showed a lot of awareness on the activities of IEEE in that area. The capacitor subcommittee should be involved. A DC blocking filter or a neutral blocking device concerns the capacitor subcommittee. After all, it is a MV series capacitor applied on the neutral of a power transformer. Our group should have something to say about it. A new paper will be written. It will be like an application guide on the things that you need to consider for the application of a neutral blocking device. Before the next meeting in Boston, Marc will work on writing the 2<sup>nd</sup> paper. The paper will provide information for specifying a neutral blocking device in order to help protecting a power transformer from GMD successfully. He will send the paper to the members of the GMD mitigation task force, shunt capacitors and series capacitors working groups for comments. Written feedbacks are requested from the experts that are around the table. The IEEE has been using the expertise of the regulators to provide a good education about what is reasonably prudent and what is good utility practice. IEEE has earned the respect of FERC. They are watching the situation, understanding that for the next cycle, there is nothing that we can do. It's important to take the time to do right things right before the following cycle.

#### **I. Task Force on Capacitor Discharge Limitation Application Paper – Roy Alexander**

Roy showed a presentation about his capacitor discharge and made some recommendations. Made a presentation of the details of the test and its methodology. Described the nature of the destruction of the connections from the discharge inside of the capacitor. Discussed an equation that can be used to compare one set of tests versus another per different discharge levels leading to failure. It lead to some recommendations on a Standard 18 type test and possibly increasing the number of shots. A proposition was made to define the circuit a little better in order to make it as short as possible, in the range of 1 meter and/or 1  $\mu$ H of external inductance. It will make a big difference in the results. Some recommendations were made on application guide 1036 for what users should be able to expect in terms discharges and number of discharges at various levels during a capacitor life. Roy is moving on to the next phase: testing smaller capacitors.

## **VII. Old Business**

Tom Grebe is continuing to maintain the website. The subcommittee website can be found at: <http://grouper.ieee.org/groups/td/cap/>

## **VIII. New Business**

During the various meetings, 2 new subjects came in. One was a proposal to remove all standard 18 references from standard 824 so that 824 can stand on its own. It is mainly because 824 referenced 18 for a table that was moved to application guide 1036. 18 refer to capacitor units in general. It is a good practice to prevent a standard from referring to an application guide. Maybe series capacitors should have its own guide. The second new subject was the renumbering the IEEE capacitor documents like other IEEE standard (For example C36.1, C36.2, etc.). Substantial work would be required. Various concerns were raised about breaking the references from previously published literature. Part of the group is not convinces that it's worth the effort. Others think that it could be done with dedicated redirection pages on the IEEE Explore website. It could take up to 10 years to complete. The group agreed to think about it and revisit the subject during the PES GM in Boston.

## **IX. Future Meetings**

- July 17-21 2016, PES GM, Boston, MA, USA
- January 8-12 2017, PES JTCM, New Orleans, LA, USA
- July 16-20 2017, PES GM, Chicago, IL, USA

Minutes prepared by Frédéric St-Hilaire.