

**MEETING MINUTES**  
*IEEE / PES Transformers Committee*  
*Performance Characteristics Subcommittee*

**Working Group for the revision of C57.142**

**Pittsburgh, Pennsylvania**  
**Tuesday, March 27, 2018**  
**3:15 PM – 4:30 PM**  
**Urban (17)**

**Chairman – Jim McBride**  
**Vice Chair – Xose Lopez-Fernandez**  
**Secretary – Tom Melle**

- 1) Meeting called to order at 3:15 PM
- 2) Welcome and Chair's Remarks
- 3) No essential patent claims made
- 4) Circulation of Attendance Sheets  
73 Attendees were present (45 Guests)  
28 of 54 Members present (quorum was achieved)
- 5) No opposition to approval (motion by Phil Hopkinson and 2<sup>nd</sup> by Rogerio Verdolin) of Agenda and Minutes from Last WG Meeting.
- 6) Approval of Agenda (motion by Pierre Riffon and 2<sup>nd</sup> by Rogerio Verdolin)
- 7) Review of C57.142 Draft 4 – March 2018, Chair noted that some editorial changes have been included. However, there may be additional editing / cleanup needed. Much of the material from the task force paper and the neutral grounding material have been included in Draft 4. The chair requested that the membership please review and comment on the existing draft in the next two weeks if possible. We will be presenting this draft at the upcoming meeting with the Switchgear Committee in Florida.

Pierre Riffon made a comment about (capacitor bank) switching control / disconnect switch transients as a mitigation method. This mitigation method is included in the present draft Annex 5 Example 5.

There was a suggestion to possibly bullet point mitigation methods after each example.

Question: Joshua Yun asked if the SGC is working to further mitigate the transients created by switch devices.

Answer: There is no knowledge of active work by SGC, but several OEM's are working on limiting/preventing re-strike/re-ignition by different methods during reactor switching. We are planning to meet with the SGC at their upcoming meeting.

Phil Hopkinson asked about mitigation on the LV side of a power transformer. The Chair stated that adding capacitance to the LV side was used in the auto-transformer example. However, other methods may be more commonly used today. Phil stated that at least one manufacturer has placed arrestors at 25/50/75% points in the winding. He stated that at 34.5 kV and below static shields added to the winding seems to increase probability of surviving re-strikes.

- 8) Upcoming Co-Sponsor Switchgear Committee Meeting –  
April 22<sup>nd</sup> – 26<sup>th</sup>, 2018 in Lake Buena Vista, FL  
C57.142 WG Update Meeting Tuesday, April 24<sup>th</sup>, 2018 2:00–6:00pm
- 9) Upcoming CIGRE Meetings in Rio de Janeiro, Brazil – April 9-12, 2018  
April 9<sup>th</sup> -11<sup>th</sup> - JWG A2/C4.52 HF Transformer Modeling. April 12<sup>th</sup>  
CEPEL Workshop on High Frequency Transient Measurement
- 10) Mitigation Methods, Factory Testing, and Field Service Conditions TF

Phil Hopkinson – TF Chair  
Pierre Riffon – TF Vice-Chair  
Akash Joshi – TF Secretary  
Jim McBride  
Mike Spurlock  
Hamid Sharifnic  
Shekhar Vora  
Waldemar Ziomek  
Pugal Selvaraj  
Dave Caverly  
John Hall  
Amitabh Sarkar  
Changir Sen  
Monty Goulkhah  
Rogerio Verdolin

Phil Hopkinson reminded the WG that many old transformers had electrostatic shields, but they were not required to pass 100-200 BIL testing for 34.5 kV. Transformers that are failing in the field are passing test levels. Mitigation methods with some success have included: higher BIL, open terminal special impulse test, and fast-front switching surge with a long tail time. Phil urged the group to focus on both design and test. The conclusion is that increasing the series capacitance and reducing the capacitance to ground should improve the design.

Question: Dr. Bob Degeneff – how many transformers have these or are these problems affecting? He noted that factory testing is not necessarily realistic (e.g. impulse is not superimposed on 60 hz waveform)

Bill Lazerlere – Bill cautioned about putting capacitors in series with voltage taps as the capacitor may not be a “capacitor” at the higher frequencies. This mitigation method is under discussion and not necessarily the best or only mitigation tool.

Failures (Jagdish Burde) many transformers that seemed initially to fail due to switching transients.

Nigel McQuinn mentioned that in the past snubber circuits were used as mitigation methods to counteract steep front waves affecting motors and the same technology could be used for protection of transformers. The use of snubbers, however, is not as practical with HV/EHV systems. The chair noted that snubber mitigation methods were used in some of the examples in C57.142.

Joel Kern has witnessed several failures due to switching transients in a variety of transformers including factory transformers and wind farm units.

- 11) New Business: none
- 12) Next Meeting: Jacksonville, FL
- 13) Adjournment at 4:30 PM (motion by Pierre Riffon and 2<sup>nd</sup> by Rogerio Verdolin)