

2015 Generator Subcommittee Meeting

Minutes of Meeting

Tuesday, July 28, 2015, 8:00AM–12:00 PM

Location: Denver, Colorado, USA

1. Call to Order

The meeting was called to order by Chairman John Yagielski. Attendees presented themselves in order of seating. Please refer to Attachment A for a listing of the attendees.

2. 2014 Minutes

The minutes of the 2014 meeting were approved as submitted.

3. Review of Agenda

The Chairman suggested a quick review of the Agenda. A question about the meaning of working group marked WG X. It was explained that it meant the working group number was to-be-determined, and suggested that the new WG should be named WG 115. The Agenda was then approved.

3. Election of Officers:

The Chairman proposed that because the Chairman and Vice-Chairman had only served in their previous positions for only a year, rather than two, that they should serve in their present position for an additional year, and that nominations for a new Secretary should occur next year. The proposal was accepted.

4. Officer Reports:

The Chairman stated that a short report of Working Group activity was submitted to, and would be presented at the EMC meeting. The key points made are: 1) The GSC roster shows 53 members, which has grown from about 25 members two years earlier. 2) One Guide and one Standard were issued in the previous year, 3) The Grid Code Task Force was created, and 4) two more working groups will be created for Standards that are up for review.

5. Working Group reports:

Working Group 1 (Awards and Recognitions). Nils Nilsson clarified that the Working Group is in charge of three classes of award: 1) Service Award for Outstanding Participation, 2) Nomination for Outstanding Standard, and 3) Nomination for Prize Paper. Working Group 1, in cooperation with the Transaction editors, and others, will present the nominations for Prize Paper at the EMC meeting. Nils also encouraged the GSC members to nominate for other awards such as the Tesla, Veinott awards. He proceeded to mention the Award recipients:

Service Award: Kevin Mayor for outstanding service to the Power Engineering Society, including chairing of the Electric Machinery Committee.

Outstanding Standards Award: STD 1812, IEEE Trial-Use Guide for Testing Permanent Magnet Machines. Haran C. Karmaker (Chair), H. Bulent Ertan (Vice-Chair) and Mehdi Abolhassani (Secretary).

Prize Papers:

“Voltage Ride-Through Capability Verification of Wind Turbines With Fully-Rated Converters Using Reachability Analysis”. Hugo Nestor Villegas Pico and Dionysios Aliprantis.

“Circuit Parameters Determination Involving Stray Load Loss and Harmonic Torques for High-Speed Induction Motors Fed by Inverters”. K. Yamazaki, A. Suzuki, M. Ohto, and T. Takakura.

“Design Paradigm for Permanent-Magnet Inductor-Based Power Converters”. G. M. Shane and S. D. Sudhoff.

Working Group 5 (Standard 492, Guide for Operation and Maintenance of Hydro-Generators). There was no report from Working Group 5. The Chairman pursued contacts for status on this Working Group without feedback or response. It was suggested that he contact Don McLaren as another possible source of information.

Working Group 8 (Comparison of IEEE C50.13 and IEC Generator Standards). Mike Sedlak reported that the standard was revised in 2014, so that the standard is now applicable for another 10 years. The Working Group has moved into Phase 2 to continue the process of harmonizing C50.13 with the corresponding IEC standards and resolving details that were not resolved in the previous year. There were 85 comments received on the 2014 standard, some of which were left for phase 2. A small subgroup went through the comments and reduced these to 10 to 12 items that have generated action items and have persons tentatively assigned. These items are mostly related to increased verbiage and the Vibration and Acoustic sections of the standard. Appendix B in the standard will also be reviewed or expanded to provide tutorial value. The group will continue to have Webex meetings and decide whether a new PAR will be generated this year or in 2016. Discussions about how to address the PAR requirements will be discussed during the next Working Group meetings.

Task Force on Grid Code Impacts on Machine Standards. John Yagielski reported in lieu of Robert Thornton-Jones. John reported that the Task Force that was created last year has had monthly discussions and an extended working session on July 27. He stated that input to the C50.13 could come from recommendations from this Task Force. It is planned that a Panel Session at next year’s meeting would provide a summary report and recommendations for changes to machine standards to potentially accommodate the grid codes. A technical report from the Panel Session would follow. Bob Gray noted that the title of the technical report had been modified during the previous day working session.

6. Liaison Reports:

Jim Lau reported that the Materials Subcommittee has been continuing to meet every six months with the potential to meet once a year if WebEx meetings are held. The next meeting will be in Dallas, Texas. Jim reported on the Materials Subcommittee activity, and provided a written report which can be found in the Appendix. Jim requested guidance regarding the overlap between IEEE 62.2 which refers to Diagnostic Field Testing of Generators, and Std 56 which is a guide for insulation maintenance. Bill Barclay offered Jim help in this area. There was much discussion regarding the Materials Subcommittee joining the IEEE-PES meeting and/or presenting a Paper or Panel Session. There were also many detailed discussions involving

Very Low Frequency Testing of Insulation compared to other insulation testing. No concrete actions or conclusions were discussed.

The Liaison for the Excitation Systems and Control Subcommittee was not available for reporting.

Nils Nilsson reported that the Power System Relay Committee meets 3 times a year, with the next meeting in La Jolla, California in September 2015. The Rotating Machinery Protection Subcommittee has 15 Working Groups. Of significance are concerns reported by Working group J13 on accurate modeling of generator transients with standard transient stability programs. For additional information it was suggested to contact the PSRC chair.

Izzy Kerzenbaum brought up the question whether anyone was working on a new relay to detect Cybersecurity threats. It was stated there is a new committee working on cybersecurity. There was a general question about whether the GSC needs to be involved or create a Liaison with that committee to understand how to implement such a system.

The Hydroelectric Power Subcommittee Liaison was not present to report.

The Motor Subcommittee Liaison was not present to report.

Regarding Wind Energy Machines and Systems, no Liaison Report was given.

7. Standards Review

Innocent Kamwa reported that there were no significant issues for the GSC because Standard 1110 “Guide for Synchronous Generator Modeling Practices and Applications in Power System Stability Analyses” is the only one that expires in 2018 and will have to address Standard 115 next year since it expires in 2019. Regarding Std. 1665 “Rewind of Synchronous Generators” will need to be addressed now as well. These three topics will be addressed in the New Business section.

Participants for Standard 1110 is high, it has 31 persons interested, and 18 officially registered. The PAR has been submitted and approved by the EMC. The WG would like to introduce one chapter related to implementation of the models, and would like resolve debates about field quantities, saturation, and how to move from equivalent circuits to time constants, and get agreement so it can be used for NERC requirements.

It was reminded that Standard oriented meeting must start with slide regarding policies and procedures. Innocent volunteered to send the link to the slides, or they are obtainable from Malia Zaman. The Chairman reminded all that Working Groups need: 1) a Chairman, Vice Chairman and a Secretary, 2) An Agenda sent out 30 days in advance, 3) Minutes of meeting published, 4) An attendance record. It was also added that a Roster of voting members to determine quorum and an attendance record with disclosure of affiliation.

Quorum rules, SA membership, member responsibilities, etc, were discussed at length.

8. Web Site

It was suggested that the GSC website conform to a format similar to other EMC websites for ease of finding information. The Chairman will contact the Web Master to find a process to do this. The Chairman also will ask that the Working Group contact information be in the website.

9. Old Business

Old Business topics were covered during standards and Liaison Reports. Nothing else to add.

10. New Business

Three Standards need addressing: Standard 1110, which is making good progress. The IEEE Std. 1665 - Guide for rewind of Synchronous Generators and IEEE Std. 115- Guide for Test Procedures for Synchronous Machines.

A Motion to create a Working Group for IEEE Std. 1665 was passed, with Izzy Kerzenbaum as Chairman, Mike Sedlack as Vice Chair, and Jim Lau as Secretary.

A Motion to create Working Group for IEEE Std. 115 was passed, with Haran Karmaker as Chairman, Innocent Kamwa as Vice Chair, and Bob Gray as Secretary.

A Panel Session for report-out of Task Force on Grid Code Impacts on Machine Standards will be requested. Working Group Sessions for Std. 1110, Std. 1665, Std. 115, IEEE 62.2, and all other active Working Groups will be submitted.

Bob Gray requested a note to address IEEE 1129 – Guide for Online Monitoring of Large Synchronous Generators in the GSC 2016 meeting.

Attachment A— GSM 2015 Attendees

2015 Attendance List, Generator Subcommittee - Electric Machines Committee		
Last Name	First Name	Affiliation
Bartley	William	HSB
Bloethe	William G.	Sargent & Lundy
Bortoni	Edson	Itajuba Federal University
El Kahel	Mohammed	Alstom Power
Gray	Bob	Siemens Energy
Hattori	Kenichi	Mitsubishi-Hitachi Power Systems
Jemimah	Akior	Ph.D. candidate, Concordia University
Kamwa	Innocent	Hydro-Quebec/IREQ
Kapelina	Jason	WEG/EM
Karmaker	Haran	TECO Westinghouse
Kerzenbaum	Izzy	Exponent
Klempner	Geoff	AMEC NSS
Lau	Jim	Siemens Energy
Malik	Om	University of Calgary
Mayor	Kevin	Alstom Power
Michalec	Jim	WEG Electric
Nilsson	N.E. (Nils)	Lanier Consulting
Rico	Raul	Siemens Energy
Rioual	Michel	EDF
Sedlak	Mike	NRG Energy
Siniscalchi	Roberto	Furnas Centrais Electricas
Yagielski	John	GE Power & Water
Zaman	Malia	IEEE
Zeidman	Marc	Sargent & Lundy

Attachment B— Liaison Report from Materials Subcommittee – Jim Lau For July 2015 PES

1. Meetings:
 - a. The Materials Subcommittee met twice since the last PES/EMC subcommittee meeting. Since the MSC has a number of standards and guides in work, we plan to continue meeting twice per year.
 - b. We met in the fall on October 29 in Columbia South Carolina (hosted by Electrolock)
 - c. We met just after the DEIS on June 11 in Seattle.
 - d. The next meeting is scheduled this fall on November 4 & 5 in Dallas Texas (hosted by Shermco Electric).
 - e. The next EIC is June 22-23 in Montreal Canada.

2. Officers until the end of 2015: Chair – Aleksandra Jeremic; Vice Chair – Paul Gaberson; Secretary – Tyler Gaerke

3. List of standards - There are quite a few standards and guides sponsored by the MSC. Here is a summary as discussed in the MSC meeting:
 - *43-2000 (revised 2014) IEEE Recommended Practice for Testing Insulation Resistance of Rotating Machinery*, **Chair: Ian Culbert / Eric David**

No work done on this standard at this meeting.

ACTION: Valid till 2024. Open for discussion in 2019. IEEE MSC June 2015, Seattle

- *56-1977 (reaff 1991) IEEE Guide for Insulation Maintenance of Electric Machines Rated 35 kVA and Higher*, **Chair: Doug Conley, Vice Chair: Dave McKinnon, Secretary: Jim Lau (P56 – active)**

P56 Draft Rev 28 - The working group met to discuss the 38 comments received and any open issues that those present raised in an open forum. At this meeting the comments received to due date for comments were addressed. All the comments of this meeting's discussion as well as any additional received to date will be incorporated.

ACTION: Chair to submit it to the IEEE SA for MEC (mandatory editorial coordination) in July, 2015, and later on for the formal ballot.

- *95-2002 (reaff 2012) IEEE Recommended Practice for Insulation Testing of Large AC Rotating Machinery with Direct Voltage*, **Chair: Dave McKinnon**

No work done on this standard at this meeting.

ACTION: Valid till 2022, and open for discussion in 2017.

Please see Appendix B Interpretation of IEEE 95 prepared by Mr. McDermid.

- *117-1974 (reaff 1991) IEEE Standard Test Procedure for Evaluation of Systems of Insulating Materials for Random-Wound AC Electric Machinery*, **Chair: Dr. Nancy Frost, Secretary: Shawn Filliben (P117 – active)**

Ballot went out in 2014 and the Chair proposed resolved comments prior to this meeting, in particular for negative votes. WG members have two weeks to comment on resolutions proposed, then going to recirculation.

ACTION: Document needs to be completed by December 2015. Recirculate the document the latest end of July.

- *286-2000 (reaff 2012) IEEE Recommended Practice for Measurement of Power Factor and Power Factor Tip-up of Rotating Machinery Stator Coil Insulation*, **Chair: Gary Heuston**

No work done on this standard at this meeting.

ACTION: Valid till 2022, and open for discussion in 2017.

- *304-1977 (reaff 1991) IEEE Standard Test Procedure for Evaluation and Classification of Insulation Systems for Direct-Current Machines*, **Currently administratively withdrawn.**

No interest was expressed at October, 2014 meeting for reopening. Document will remain withdrawn.

- *433 - 2009 IEEE Recommended Practice for Insulation Testing of Large AC Rotating Machinery with High Voltage at Very Low Frequency*, **Chair: Ashfak Shaikh, Secretary: Aleksandra Jeremic (P433 – active)**

Issued in 2009. Will need a full review and revision by December, 2019. Work started at this meeting. PAR was submitted in May, 2015 and will be considered at Sep 2, 2015 NesCom meeting.

ACTION: Survey the end users, utilities and OEMs. IEEE MSC June 2015, Seattle

- *434-2006 (reaff 2013) IEEE Guide for Functional Evaluation of Insulation Systems for AC Electric Machines Rated 2300 Volts and Above, Chair: Stefano Bomben*

No work done on this standard at this meeting.

ACTION: Valid till 2023. Open for discussion in 2018.

- *522-2004 (reaff 2009) IEEE Guide for Testing Turn-to-Turn Insulation on Form-Wound Stator Coils for Alternating-Current Rotating Electric Machines, Chair: Paul Gaberson, Secretary: Kevin Alewine (522 – active)*

The 2004 revision of 522 was just a re-affirmation, so it needs a full review and revision. It is expected to be a 2 year process utilizing a core group for initial review and suggested revisions followed by a review and comments of interested participants from the general sub-committee.

ACTION: Submit the PAR by the end of 2015.

- *1043-1996 (reaff 2009) IEEE Recommended Test Procedure for Performing Voltage-Endurance Testing of Form-Wound Coils and Bars, Chair: Ramtin Omranipour, Secretary: Joe Williams (1043 – active)*

Document needs a full review and revision by December, 2019. At the previous meeting, leaders who will be gearing this process have been chosen. At this meeting there was a brief discussion regarding the methodology / issue with the space heater distributions and indications that there is no need for major revision.

ACTION: Start the PAR with the same title and scope by September 2015.

- *1107-1996 IEEE Recommended Practice for Thermal Evaluation of Sealed Insulation Systems for AC Electric Machinery Employing Random-Wound Stator Coils, Currently administratively withdrawn.*

No work done on this standard at this meeting.

ACTION: Dr. Frost to discuss resolution option with IEEE Headquarters, including note into Appendix of IEEE 117.

- *1310-2012 (1996, 2004 reaffirmed) IEEE Recommended Practice for Thermal Cycle Testing of Form-Wound Stator Bars and Coils for Large Generators, Chair: Greg Stone*

Issued in June, 2012. Will need a full review and revision by June, 2022.

ACTION: Open for discussion in 2017.

- *1434-2014 (published 2000, reaff 2005) IEEE Guide to the Measurement of Partial Discharges in Rotating Machinery, Chair: Bill McDermid (1434 – active)*

- Summarize comparative measurements that have already been made with different instrumentation and circuitry.
- Include evidence of effect of conditioning and environment.
- Establish availability of samples with known defects. IEEE MSC June 2015, Seattle
- Examples of poor grounding techniques

ACTION: WG Chair invited all interested parties to contact him regarding the future work, i.e. whether you would be able to provide the sample, or test the sample. Further reports from some OEMs will be available at the next meeting.

- *1553-2002 (reaff 2007) IEEE Test and Acceptance Criteria for Voltage-Endurance Testing of Form-Wound Coils and Bars used in Hydroelectric Generators and Large Pumped Storage Motors, Chair: Dr. Hugh Zhu, Secretary: Aleksandra Jeremic (P1553 – active)*

Full review and revision needed by December, 2018. Discussion regarding the test voltage for machines over 20 kV and whether the test hours for coils tested under 50 Hz should be increased.

ACTION: Send survey by mid of August and submit PAR by September 2015.

- *P1719 IEEE Guide for Evaluating Stator Cores of AC Electric Machines Rated 1 MVA and Higher, Chair: Glenn Mottershead, Secretary: Stefano Bomben (P1719 – active)*

The PAR is good till December, 2016, so we have to drive this rapidly to closure. Comments received from Andritz, Alstom and Ian Culbert were addressed off-line. Proposed changes from GE were addressed at this meeting. It was decided to synchronize flux level tests and duration with P56.

ACTION: Send for formal Ballot in December 2015.

- *1776-2009 IEEE Recommended Practice for Thermal Evaluation of Sealed or Unsealed Insulation Systems for AC Electric Machinery Employing Form-Wound Pre-Insulated Stator Coils for Machines Rated 15000 Volts and Below*, **Chair: Dr. Nancy Frost, Secretary: William Chen (1776 - active)**

The WG Chair introduced the following Agenda:

- WG Core team to be created;
- Title and Scope to be defined;
- Listed Issues;
- Goal of submitting the PAR.

As it was indicated at the previous meeting, the Scope may be too wide. Discussion about redefining to address 7-15kV range for long coils, while 15kV is kept in the Title.

ACTION: Document needs a full review and revision by December 2019. Submit Survey to general users by the end of July. Review proposed Title and Scope at the Fall meeting prior to submitting PAR mid of November, 2015.

- *P1798 / IEC 60034, Rotating Electrical Machines – Part 18-41: Qualification and Type Tests for Type I Electrical Insulation Systems Used in Rotating Electrical Machines Fed by Voltage Converters*, **Chair: Ramtin Omranipour, Secretary: Dr. Greg Stone**

PAR was not revised since initially issued and has expired. At this meeting, consensus was reached that IEC 60034 will not be adopted as an IEEE standard. No further work will be done.

ACTION: This working group will cease to exist. IEEE MSC June 2015, Seattle

- *1799-2012 IEEE Recommended Practice for Quality Control Testing of External Discharges on Form-Wound Coils, Vacuum Pressure Impregnated Stator Insulation and Fully Assembled Stator Windings*, **Chair: Remi Tremblay**

Document was issued in 2012, and is valid till 2022. Dr. Frost suggests to review in 2017 as to use in filed and revision level required. No work done on this standard at this meeting, however it was decided that Claude Hudon will be the next Chair as Remi Tremblay is not active any more within this committee.

ACTION: Open for discussion in 2017.

- *NEW Trial Use Guide For the Thermo-Mechanical Endurance Testing of Turn Insulation for Form Wound Multi-Turn Stator Coils*, **Chair: Joe Williams III, Secretary: Kevin Alewine**

The Core Members met in Toronto in April to discuss the progress they had made in working with this draft guide. Due to widely scattered results so far, as well as the lack of widely available impulse generators capable of breaking down the turn insulation in high voltage coils, it was suggested that it might be more practical to publish this test method as an IEEE paper focused on medium voltage machines. This would give manufacturers a chance to work with the method for a few years, gain experience and gather more data before trying to develop an IEEE guide.

At this meeting, the issues were reviewed and consensus was reached to cease existence of this working group and publish an IEEE paper.

ACTION: Call for volunteers to co-author the IEEE paper on the test method with Dr. Bal Gupta.

- *NEW – IEEE Trial Use OR Guide for Advanced Diagnostic Test Methods for AC Electric Machinery using Direct Voltage*, **Chair: Laurent Lamarre, Secretary: Tyler Gaerke**

Title, Scope, Purpose were established at the Spring 2015 meeting.

ACTION: Submit the PAR by August, 2015.

- *NEW – IEEE Dissection Guide*, **Chair: Dr. Frost, Vice-Chair: Charles Millet, Secretary: Andy Brown**

Document skeleton and selecting techniques were proposed at this meeting. Utilizing a core group for initial work, followed by a review and comments of interested participants from the general sub-committee, ground work will be established for PAR submittal.

ACTION: Chair to form the Working Group Committee. Submit PAR prior to Fall 2016 meeting.

- IEEE 62.2 – withdrawn Jim Lau agreed to be WG chair for a group to open this for revision.
4. Other MSC activities
- a. Clyde Maughan was nominated for IEEE Fellow Submitted by Richard Huber
 - b. Liasons Reports
 - a) CIGRE - Howard Sedding – No report.
 - b) IEC
 - i) TC 2 (Rotating Machinery) – Dr. Greg Stone – Report is attached as Appendix C.
 - ii) IEC 60034-1 – Tyler Gaerke – No report
 - iii) TC112 (Qualification of Electrical Insulation Materials & Systems) – Dr. Nancy Frost - No report.
 - c) Electric Machinery Committee –
 - i) Generator Subcommittee
 - (1) IEEE/ANSI C50.13 – Jim Lau
 - This document will be changed on a two year basis.
 - ii) Motors Subcommittee – Dr. Akira Chiba –
 - (1) NEMA MG1 part 31 – Tyler Gaerke
 - iii) Transformers Committee – Dave Stankes – No report
 - iv) Nanomaterials – Dr. Frost – No report.