

Meeting Minutes of the IEEE Materials Subcommittee of the Electric Machinery Committee of the Power and Energy Society

Date and time: Thursday, October 11, 2012, 11:30 am – 12:15 pm

Location: Charlotte, NC (hosted by Siemens)

1. Meeting call to order, Agenda, Introductions and Attendance sheet.

Dr. Frost called the meeting to order and introduced the agenda. The officers are:

MSC Chair – Dr. Nancy Frost

Vice Chair – Aleksandra Jeremic

Secretary – Paul Gaberson

The attendance sheet was circulated (total attendance was 41, see section 12).

2. Approval of the Minutes of the Last Meeting:

Motion to accept with note that the title of the minutes as distributed was incorrectly shown as “agenda”. Moved by Chuck Wilson, seconded by Stefano Bomben, all in favor – YES.

3. Chair’s Comments:

- **Many thanks to Doug Conley and the Siemens team for hosting this IEEE Materials Subcommittee meeting.** This is the second time that we have held the subcommittee meeting without connection to another IEEE related conference. Attendance has remained strong so we plan on continuing this practice for the fall meetings.
- **IEEE Standards Association requires that a request be made at each WG meeting for disclosure (identification) of any patents or copyrights that may be related to this work.** The chair or the chair's delegate of an IEEE standards-developing working group or the chair of an IEEE standards Sponsor shall be responsible for informing the members of the working group/participants at a meeting that if any individual believes that Patent Claims might be Essential Patent Claims, that fact should be made known to the entire working group and duly recorded in the minutes of the working group meeting. This request shall occur at every standards developing meeting once the PAR is approved by the IEEE-SA Standards Board.
- The chair or the chair's delegate shall ask any patent holder or patent applicant of a Patent Claim that might be or become an Essential Patent Claim to complete and submit a Letter of Assurance in accordance with Clause 6 of the IEEE-SA Standards Board Bylaws. Information about the draft standard will be made available upon request. **Working group Chairs, please state this at every meeting and keep an eye out for patentable information.**
- **It is strongly suggested that copyright forms** for figures or images be gathered as they are entered into the draft standards, so that credit for said images and figures are maintained from the beginning. **Working group Chairs please remember this requirement! Application has been inconsistent and we must fulfill this requirement.** If there are questions as to whether a copyright form is required, please contact our IEEE liaison, Malia Zaman and the IEEE MSC Chair, as we can help you resolve the issues.
- **It is important to understand definition and responsibilities of being a Member of the Working Group. More information to be provided by the Chair via email regarding the Policy & Procedures relating to Working Group membership and chairmanship.**

- **Chair reminds all the Standard Chairs of the following:**
 - Please cc Nancy Frost on communications with the IEEE.
 - Once the standard is issued, the form has to be signed and sent to the IEEE representative, Mr. Kamwa. Please send the pdf file to Dr. Frost.

4. Standards Coordinator Report and Discussion

Innocent Kamwa is the Standards Coordinator for the Electric Machinery Committee.

ACTION: The Chair will forward meeting minutes to him after this meeting.

5. Working Group Reports and Discussion

- *43-2000 (reaff 2006) IEEE Recommended Practice for Testing Insulation Resistance of Rotating Machinery, Chair: Ian Culbert*

Working group finished review of comments resulting from the straw ballot.

ACTION: Intent is to official ballot by the end of 2012.

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

PAR has been revised and has a new expiration date of Dec. 31, 2016. A straw ballot was conducted and a large number of comments were received. To expedite resolution of the comments a small select committee has been formed.

ACTION: Circulate the new Draft in January 2013 and decide if straight to ballot or to another straw ballot.

- *95-2002 (reaff 2007) IEEE Recommended Practice for Insulation Testing of Large AC Rotating Machinery with Direct Voltage, Chair: Dave McKinnon*

Reaffirmation completed in August. Dave McKinnon to forward confirmation to Dr. Frost (done). Congratulations to Dave for rapid completion of the reaffirmation.

- *117-1974 (reaff 1991) IEEE Standard Test Procedure for Evaluation of Systems of Insulating Materials for Random-Wound AC Electric Machinery, Chair: Nancy Frost*

The editorial board required changes with respect to how IEEE Std. 1107 (water immersion testing) was referenced within IEEE Std. 117 and the changes require a revision to the PAR. The working group was polled and has decided to reference the water immersion test in a footnote making it informative within Std. 117 (thus requiring anyone needing details on the immersion test to go to Std. 1107 for details). Malia Zaman advises that modification of the PAR will not necessitate a new ballot pool.

ACTION: Revise the PAR and move to official ballot ASAP.

- *286-2000 (reaff 2006) IEEE Recommended Practice for Measurement of Power Factor and Power Factor Tip-up of Rotating Machinery Stator Coil Insulation, Chair: Gary Heuston*

Voting resulted 98% acceptance and 85% response rate, with one negative ballot (relating to some of the “old” references). After discussion with the dissenting voter, there was another ballot and the same person voted no again. Malia Zaman advised that this negative vote can be handled through RevCom.

ACTION: The specification is now on the agenda for the December meeting of the RevCom and approval is expected.

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

No discussion of this standard at this meeting. Howard Penrose and Jeff Hudson have previously expressed interest in reopening.

- 433-(2009) *IEEE Recommended Practice for Insulation Testing of Large AC Rotating Machinery with High Voltage at Very Low Frequency*

Issued in 2009. No work done on this standard at this meeting. Will need to be revised and approved again by December 2019.

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

Initial ballot resulted in two negative responses. These negative votes have been discussed with the dissenting voters and resolved. The specification is now on the agenda for the December meeting of the RevCom and approval is expected. Stefano mentioned that too many of the respondents to the ballot pool are entering the same voter category and this is causing a problem. The Standards Association wants a relatively uniform distribution of voters with representatives from all categories.

ACTION: The specification is now on the agenda for the December, 2012 meeting of the RevCom and approval is expected.

ACTION: In future, ballot members are invited to enter the appropriate category, rather than choosing generic “user” one

- 522-2004 *IEEE Guide for Testing Turn-to-Turn Insulation on Form-Wound Stator Coils for Alternating-Current Rotating Electric Machines*

Reaffirmed in late 2009. No work done on this standard at this meeting. Will need to be revised and approved again by December 2019. Recommend discussion be started in 2015.

- 1043-1996 (reaff 2003) *IEEE Recommended Test Procedure for Performing Voltage-Endurance Testing of Form-Wound Coils and Bars*

Reaffirmed in 2009. No work done on this standard at this meeting. Will need to be revised and approved again by December 2019. Recommend discussion be started in 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.**

Plan to incorporate aspects of this specification into IEEE Std. 117 was not acceptable to the editorial board. Otherwise there was no discussion of this standard at this meeting. Once P117 resolved, discussion to be had if this standard needs to be reactivated.

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

Issued in June 2012. Working group members should have received their copy.

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

Draft 6 of the specification was discussed. Comments continue to be received. A new draft will be distributed soon. The PAR is good until December 2014, so we need to start driving to completion.

ACTION: WG members: There is a need to identify recently published significant papers on this topic and add them to the bibliography.

- *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: Ramtin Omranipour**

The standard was discussed and it was noted by Greg Stone that getting any changes approved would be extremely difficult based on the experience with the initial approval. However, under the new rules there is no reaffirmation so a revision will be needed by December 2018.

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

A new revision (Rev 32) has been prepared by Cathy Campbell. The specification has been extensively revised and reorganized to improve flow and clarity. Approximately 70% of the changes were reviewed. A complete new revision will be distributed to the working group within 6 to 8 weeks. Stefano asked for volunteers to fill out the evaluation table to see how this tool is working. The PAR is good for another two years.

ACTION: New revision to be prepared.

ACTION: WG members to submit data for evaluation table

- *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*

Issued in 2009. No work done on this standard at this meeting. Will need to be revised and approved again by December 2019.

- *P1798 Qualification and Type Tests for Type I Electrical Insulation Systems Used in Rotating Electrical Machines Fed by Voltage Converters*. **Chair: Meredith Stranges / Ramtin Omranipour**

This standard is to be a duplicate/adoption of IEC 60034-18-41. Currently the IEC standard is undergoing extensive revision and will be discussed next week at the IEC meetings in Japan.

Many of the proposed changes are controversial and will require new action by manufacturers to implement (potential nameplate change). It is hoped that a revised document will be available by the next MSC meeting. See more detail in the IEC liaison report. Until then P1798 remains on hold.

ACTION: IEC committees to resolve their document.

- *P1799 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**

Approved but not submitted to Standards Board yet. There are some editorial revisions to be made but this will not require recirculation or new voting.

- *NEW - Endurance Test for Turn Insulation in Rotating Machine Coils*
Chair: Joe Williams III

There was discussion about limiting the scope to coils with rated voltage less than 7kV but it was decided not to do so. Interested parties are still encouraged to run some tests and present their data for consideration. It was also suggested that evaluation using some form of repetitive voltage be considered.

ACTION: Members are invited to contribute.

- **NEW** – *IEEE Guide for Advanced Diagnostic Test Methods for AC Electric Machinery using Direct Voltage*, **Chair: Laurent Lamarre, Secretary: Shawn Filiben**
- Reviewed details of the polarization/depolarization testing technique. Discussion had about options for the title to be resolved when more content is available. Step ramp rates were also discussed. A section on requirements for test instrumentation, in particular source requirements, is considered necessary. Ian Culbert questioned the type of Instruments used for the Measurement Set-ups, in particular the commercially available DC sources. It was emphasized by Paul Gaberson that the phrasing should be tailored carefully in order to prevent some entity to patent this technology. **IMPORTANT REMINDER!**
ACTION: A copy of the document will be circulated by the end of November.

6. Other MSC activities

- Awards and Recognition. **Chair: Hugh Zhu**
Report sent to IEEE MSC committee for review. No items for general information.

7. Liaison Reports

- **CIGRE – Howard Sedding and Remi Tremblay**
See attachment 1 for information provided by Remi Tramblay.
- **IEC – Greg Stone**
IEC TC 2 (Rotating Machine) Liaison Report to EMC, Materials Subcommittee

IEC TC 2 continues to be very active in the development and revision of rotating machine insulation standards. Generally there are two meetings per year, each lasting about 1 week. The most recent series

of meetings were held in the UK the week of May 7, 2012. Meredith Stranges, Howard Sedding and Greg Stone attended. The next meeting is in 1 week (Oct. 14-16, 2012) in Japan.

Over the past few years the entire series of IEC 60034-18 (rotating machine insulation systems) documents were under revision. The master insulation qualification document 60034-18-1 plus the subsidiary documents on thermal qualification (-21 and -31), voltage endurance testing (-32), thermal and voltage qualification (-33) and load cycling (-34) have been revised or are near completion.

IEC 60034-18-41:2006 for the qualification of insulation systems for low voltage converter fed motors is being revised. The Japanese and Germans in particular suggested many changes. This has resulted in changes to the PDIV levels for such motors. Comments have been received on a new draft and there will clearly be a lot to discuss in the October meeting to resolve the comments. I expect it will be published in 2013, and it will introduce the concept of a “converter rated voltage” which would be eventually shown on the nameplate.

IEC 60034-18-42 is next up for revision. It is concerned with the qualification of “type II” insulation for converter duty (normally form wound stators). A lot of important changes are being made on the series of voltage endurance tests that are needed to qualify the insulation system. This is the main topic at the October 2012 meetings.

IEC 60034-27-2, concerned with on-line PD testing of machines, was published a few months ago.

IEC 60894 on machine dissipation factor testing (originally based on IEEE 286) is being revised under the convenorship of Juergen Weidner of Siemens. The new document will be rebranded as IEC 60034-27-3. The fairly stringent tip-ups being proposed (based on KEMA limits) do not seem to be getting support from many companies in Asia and Europe. It is not clear to me if this document is needed if the tip-up limits are trivial to meet.

Since George Gao is no longer with TECO Westinghouse, the US rep position (nominated by NEMA) is apparently open.

A new IEC WG (TC2, WG 32) has been formed to create a guide for off-line and on-line stator endwinding vibration testing. The chair is Horst Kuemmler of Siemens, Germany. It will describe the problem, as well as how to do bump tests and how to do on-line monitoring. It is for all conventional motors and generators. It will not provide any limits. We held the first meeting in June and the next is in Vienna, in December. Somewhat surprising, there is no US WG member.

Greg Stone
Oct 11, 2012

- **IEC – Roger Wicks**
IEC TC 112 (Evaluation and qualification of electrical insulating materials and systems)
Roger gave an oral report of documents of interest, and has agreed to provide report in future meetings. (To be fair, he was given little notice in this meeting.)
- **ELECTRIC MACHINES COMMITTEE**
No report at this time.
- **Generator Subcommittee**
Nancy will discuss our involvement Gen SC activities with Bill Bartley.
- **Motor Subcommittee**
Nancy is trying to establish contact with Nick Stranges to facilitate information exchanges.

8. Old Business

There were no items to be addressed at this meeting.

9. New Business

Revision of our website was discussed. Howard Penrose is developing a website that will meet IEEE requirements. Roger Wicks offered some suggestions based on what he has seen from the Transformer group of IEEE Power and Energy Society. More information will be provided as we move forward.

10. Next Meeting

- It was proposed that the next meeting of IEEE MSC be held at the EIC conference in Ottawa in June 5/6 or 6/7, 2013, dependent on the conference schedule. Moved by Chuck Wilson, seconded by Stefano Bomben, all in favor – YES.
- The location of the Fall 2013 meeting was discussed. Bill McDermid volunteered to host the meeting in Winnipeg. There were no other offers so this offer was accepted. Dates were proposed but there are several possible conflicts. CEIDP will be held in China during the week of Oct. 21 so it has initially been proposed to hold the meeting on Oct. 16 and 17, depending on IEC TC 2 scheduling. This was agreed upon, with final proposal/vote as to date to be made via email before close of 2012.
- It was proposed that the June 2014 meeting of the IEEE MSC be held at the EIC conference in Philadelphia. Dates to be determined.

11. Adjournment

- Moved by Chuck Wilson, seconded by Bal Gupta, all in favor – YES

Thank you ALL for a successful, non-conference related IEEE MSC Subcommittee meeting!

12. Attendees:

Name	Name
Dave Agnew	Richard Huber
Kevin Alewine	Jeff Hudson
Nathan Andersen	Marcelo Jacob
Kevin Becker	Aleksandra Jeremic
Stefano Bomben	Aleksandr Khazanov
Andy Brown	Amir Khosravi
Cathy Campbell	Thomas Klamt
Don Campbell	Laurent Lamarre
William Chen	Gerhard Lemesch
Doug Conley	Bill McDermid

Ian Culbert	Dave McKinnon
Eric David	Charles Millet
Keith Dunnavant	Sophie Noel
Tim Emery	Ramtin Omranipour
Jeff Fenwick	Emad Sharifi
Nancy Frost	Jeff Sheaffer
Paul Gaberson	Greg Stone
Michel Gagne	Roger Wicks
Anna Gegenava	Joe Williams III
Bal Gupta	Chuck Wilson
Gary Heuston	

Attachment 1
CIGRE Liaison report supplied by Remi Tramblay

CIGRE Study Committee A1 – Electrical Rotating Machines
List of Working Groups

Advisory Group A1.01
Turbogenerators
Robert E. Fenton (US)
Monday August 27, 2012
Palais de Congress - Paris

1 Work Completed in the last 12 Months

Guide on Over fluxing Generators (WG .A1.01). Neil Connolly (UK), H. Shimada (JP), BEB Gott (US) and David Wallis (UK).

Questionnaire – State of the Art and Capability for Robotic Inspection of Turbo-Generators (WG-A1.23) Marcio Siniscalchi (Brazil).

2 Active Projects (Working Groups)

Guide on Economic Evaluation Refurbish/Replace Decisions (WG -A1.05) – William Moore (US).

Guide- Consideration of Duty on Windings (WG -A1.22), Michel Berlamont (FR).

Guide – Corona Electromagnetic Probe Tests (TVA) (WG A1-28) Dan Zlatanovici (RO).

Guide on New Generator-Grid Interaction Requirements (WG-A1.29--). Luis Rouco (ES).

Guide for the Proper Storage and Cleanliness of Generators and Components(WG- A1-33). Kevin Mayor (CH).

Technical Brochure -Turbo-generator Stator Winding Support System Experience– Alberto Villarrubia (ES).

Guide for Generator On-Line Over and Under Excitation Operation Issues (WG-A1.38) – Rodica Zlatanovici (RO).

Report of Dissipation Factor (tip up) Testing Experience – Howard Sedding (CA).(WG-A1.??)

Advisory Group A1.02
Hydrogenerators
Remi Tremblay (CA)
Tuesday August 28, 2012
Palais de Congress - Paris

1 Work Completed in the last 12 Months

Generator Stator Winding Stress Grading Coating Problem (WG .A1.02). Remi Tremblay(CA).

2 Active Projects (Working Groups)

Feasibility of Updating from Class F to Class H the Insulation Systems in Electrical Rotating Machines (WG -A1.13) – Jose Luis Araco Garcia (ES).

Guide for minimizing the damage from stator winding ground faults in hydro generators_ (WG -A1.14), Oscar Martinez (ES).

Bearing Segments with Plastic Lining – Operating and Maintenance Experience (WG A1-21) Lars-Eric Kämpe (SE).

Survey on hydro generator cleaning (WG A1-25) Geir Aalvik (NO).

Usage of Magnetic Slot Wedges in Hydro Generators (WG-A1.30). Josip Studir (HR).

State of the Art of Stator Winding Support in Slot Area and Winding Overhang of Hydro-Generators (WG-A1.31) Franz Ramsaur (AT).

A Survey on Small Hydro Plants Considering Technical and Strategic Aspects: Present Status and Future Outlooks (WG A1-32) Lu Li (CN).

Testing voltage of Doubly-fed Asynchronous Generator-Motor Rotor Windings for Pumped Storage System (WG-A1.34) Osamu Nagura (JP).

Hydroelectric Generators Behaviour under Abnormal Operating Conditions (WG-A1.35) Edgar Robles (MX).

Vibration and Stability Problems In New, Old and Refurbished Hydrogenerators, Root Causes and Consequences (WG-A1.36) Jouni Ahtiainen (FI).

Survey on generator instrumentation and monitoring. Mr Marc Bruintjies (ZA) (WG-A1.XX).

Advisory Group A1.05
New Technologies
Luis Rouco (ES)
Tuesday August 28, 2012
Palais de Congress – Paris

3 Work Completed in the last 12 Months

No work completed in the last 12 months.

4 Active Projects (Working Groups)

No active working group. Mr Rouco is the new convener and he just begin his works as convener.

Advisory Group A1.06
Large Motors
Enzo Tortello (IT)
Monday August 27, 2012
Palais de Congress – Paris

1 Work Completed in the last 12 Months

Extending Life of Large Motors in Nuclear Power (WG A1.18) R. Siniscalchi (BR).

Motor Failure Survey (WG A1.19), run by V. Skundric (RS).

2 Active Projects (Working Groups)

Guide of Methods of Determining the Condition of Stator Winding Insulation and their Effectiveness in Large Motors (WG A1.17) S. Rodriguez (SP).

Questionnaire on “Monitoring, diagnosis and Prognosis of large motors” (WG A1.26) Nico Smit (ZA)

Questionnaire on “Adjustable Speed Drives and High-Efficiency Motors applications in Power Plants” (WG A1.27) E. Tortello (IT).

Next Meeting

Bucarest, Romania August 31 to September 7, 2013