

2015 Annual Report of IEEE Materials Subcommittee of the Electric Machinery Committee of the Power and Energy Society

1. Meetings

IEEE PES EMC Material Subcommittee held two meetings in 2015.

Spring meeting was held in conjunction with DEIS Electrical Insulation Conference on June 11th in Seattle, and Fall meeting was hosted by Shermco on November 5th in Dallas. Many thanks to the hosts, DEIS EIC 2015, Professor Lewin and Stefano Bomben, and Diego Robalino of Megger and Kevin Alewine of Shermco.

The next Spring meeting will take place June 22-23, 2016 in Montreal just after DEIS EIC, and Fall meeting will be hosted by IEEE CEIDP, on October 19 - 20, 2016 in Toronto.

To expedite the process of document editing, some Working Group Chairs choose to address certain aspects of document development outside the realm of these two annual meetings, while keeping all its members informed via conference calls and email correspondence. This was case with P56 and P1719 lately, in particular .

2. Officers

Meeting administration for the past two years, 2014 and 2015, was managed by the following officers:

MSC Chair - Aleksandra Jeremic
Vice Chair - Paul Gaberson
Secretary - Tyler Gaerke

At the closure of the meeting in Dallas the new Secretary was unanimously chosen by all 31 members who were in attendance. For the following two years, as of January 1, 2016 these will be serving officers:

MSC Chair - Paul Gaberson
Vice Chair - Tyler Gaerke
Secretary - Keith Grzegorzczk

3. Number of Subcommittee Members

Currently the Material Subcommittee has 111 participants of the Working Group Standards. It is important to note that not all of them contribute to all the working group meetings. Each Stnd WG Chair at the beginning of the corresponding meeting would emphasize the difference of an active participant and contributor, i.e. Member and the observer, i.e. Guest. During the Spring Meetings, attendance is typically higher as there are Conference attendees who join the meetings. However, about 40 out of 111 constitute core members of this Subcommittee.

4. Remembering Ian Culbert

At the meeting in Dallas, the Chair extended condolences to the family and coworkers of Ian Culbert who recently passed away. Ian was an invaluable member of the Materials

Subcommittee whose contributions will be missed. Several other members in attendance also offered personal statements.

5. Current Initiatives

- Working Group Chairs shall ensure that all eligible voting parties are to be represented. (OEM, Users-Owners, Academia, Independent).
- Participants are urged to join IEEE Standard Association.
- WG membership list – roster will be used to set up the website access for members only by Dr. Howard Penrose.
- Working Group Chairs must ensure copyright forms for figures or images are gathered as they are entered into standard.
- Members are encouraged to nominate deserving colleagues/teams for awards and recognition, specifically for those who comply with requirements for the Senior Member Grade.
- Clyde Maughan Fellow elevation was announced in December, 2015.
- IEEE 62.2 added to the list of standards that this Subcommittee will be working on going forward.
- Working Group Chairs are encouraged to establish liaison relationships with corresponding technical bodies of CIGRE, IEC, ASTM, NEMA, and other IEEE PES Committees and Subcommittees.

6. Working Group Activities

- *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.

- *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 (56 – active)**

Since the last meeting, the standard was updated and passed through the IEEE mandatory editorial coordination (MEC). After this process it was balloted. The ballot closed on Oct 30th, 2015 with 54 votes and 87% affirmative. The working group met to discuss the 200 comments from the ballot and focused on the 53 Comments that Must Be Satisfied. The rest of the comments will be reviewed by a focused group. The revised draft will then be circulated to the commenters.

ACTION: Chair, vice chair and secretary to address remaining comments off line with the core group and commenters, prior to the ballot recirculation.

- *62.2-2004 IEEE Guide for Diagnostic Field Testing of Electric Power Apparatus – Electrical Machinery*, **Chair: James Lau**

At this meeting it was decided to include this document into the work scope of the Material Subcommittee.

ACTION: Valid till 2019. Chair to create study group and submit PAR by December 2016.

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

No activity at this meeting.

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

- 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 Seattle meeting, in particular for negative votes. All the negative votes have been resolved.

ACTION: Document submitted to RevCom for their review on December 4, 2015 and was approved.

- 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 activity 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.

No activity at this meeting. 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)**

PAR was submitted in May, 2015, approved on Oct 26, 2015, with expiration date of Dec 21, 2019. Purpose on the PAR was accidentally deleted by the system, and hence the new PAR must be submitted. Major revisions are not expected based on this meetings discussion.

ACTION: PAR to be resubmitted. Collect additional references and send to the Group.

- 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 activity 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.

After discussion it was decided that the current Scope and Purpose would not be changed. There is a desire to add an Annex regarding why we are not covering PWM rapid rise pulse requirements and how something should be developed to look at proof testing (not voltage endurance) for VFD supplied coils/machines.

There was discussion about alignment with IEC and EASA surge testing specifications. It was decided that we will consider what those documents say, but will not make changes with the specific intention of harmonizing with those other specifications.

An extensive review and update of the Bibliography is required.

ACTION: Chair to work to finalizing a PAR by end of the year.

- 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. No activity at this meeting.

ACTION: Review the scope in June 2016 in Montreal and then submit the PAR.

- 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 activity 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)**

A major revision of IEEE 1434 was published in 2014 after 4 years and 8 meetings. At the time of the ballot additional work was identified in the area of PD tests on individual coils and bars. Two meetings have been held to date. Test methods are being documented and samples of known condition are needed.

ACTION: WG Chair invited all interested parties to provide the sample, or test the sample.

- 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)**

A PAR was issued on Feb. 16, 2015 with an expiration date of Dec. 31, 2019.

There was discussion about the highest test voltages shown in Table 1 of the spec. and if there were any organizations actually doing testing at those levels (possibly only in China).

Is there a need to go higher? What is the basis of the recommended test numbers and are they realistic?

After discussion of the text in the last paragraph of section 4.2 volunteers were requested to offer alternate wording. Paul Gaberson and Keith Grzegorzczak will collaborate and provide options to the WG Chair.

ACTION: Continue review of the document at the next meeting.

- *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. Chair led discussion regarding flux levels, vibration levels, hot spot limits, core back temperature limits, ASTM 937 versus ASTM A717, and commercial use of DIRIS versus ElCID.

ACTION: Please send further comments to Stefano Bomben. Send for Straw Ballot in June 2016. Submit the PAR Extension Request.

- *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: William Chen, Vice-Chair: Kevin Alewine, Secretary: Dr. Nancy Frost (1776 - active)**

William and Nancy agreed to change the roles.

Proposed Title and Scope were discussed at this meeting.

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 PAR after Spring 2016 meeting.

- *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**

No activity at this meeting. Document was issued in 2012, and is valid till 2022.

ACTION: Open for discussion in 2017, with Claude Hudon as the next Chair as Remi Tremblay is not active any more within this committee.

- *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 decision has previously been made to discontinue the working group and instead of trying to produce a specification, summarize the efforts in a conference paper. There was discussion of the abstract for this paper and who will be the contributing authors.

ACTION: Dr. Gupta to author a paper for the 2016 EIC summarizing the work done by the group.

- *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. No activity at this meeting.

ACTION: Submit the PAR by end of 2016.

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

Title and Purpose proposed after the previous meeting were refined at this meeting.

ACTION: Submit PAR prior to Spring 2016 meeting.

7. Any Standards that Material Subcommittee is supporting

- Chair encouraged the members to get involved with the following PES standards:
IEEE 95 Recommended Practice for Insulation Testing of Electric Machinery with High Direct Voltage

IEEE 115 Test Procedures for Synchronous Machines

IEEE 1110 Synchronous Machine Modeling Practices and Applications in Power System Stability Analysis

IEEE 1665 Guide for the Rewind of Synchronous Generators, 50 and 60 Hz, Rated 1 MVA and above