PC57.163 - WG for the Revision of IEEE Guide for Establishing Power Transformer Capability while under Geomagnetic Disturbances

10:50 AM to 12:05 PM Central, April 27, 2021 (Virtual Session)

Unapproved Meeting Minutes

The WG Chair Dan Blaydon presided over this virtual WG meeting with both the Vice-Chair, Ramsis Girgis, and Secretary, Scott Digby, in attendance. This was the second meeting of this new Working Group. Attendance numbers are as follows:

Total Attendance	99
Members in Attendance	47 (out of 62 members, **quorum was achieved**)
Guests in Attendance	52
Guests Requesting Membership	4 (3 meeting membership eligibility requirement of attendance at 2 of last 3 meetings)

Guests Requesting Membership (attendance at 2 out of 3 meetings required to qualify for membership):

	Membership Granted? (effective after this meeting)
Evgenii Ermakov	Yes
Raymond (Curtiss) Frazier	Yes
Balakrishnan Mani	Yes
Emilio Morales-Cruz	No

Participants were advised that membership requests could also be made via email requests from attendees to the WG Chair and/or Secretary.

The requisite patent and IEEE-SA copyright policy slides were reviewed. The agenda and the minutes to the Fall-2020 meeting were approved via unanimous consent. The project milestones were reviewed, with key dates being the PAR expiration date of December-2024 and the published document's expiration date of December-2025.

The Chair noted that several documents were posted under the WG section of the Standards SC website. This included the published version of the document (accessed via special password) as well as a proposed reorganization of the document that had recently been circulated to the WG for review.

The Chair provided a review of the proposed reorganization of the document, with key points being to expand the content of the background section, including bringing the content related to the GIC signature/profile and definition of effective GIC as sub-sections of the background section to have it more in the forefront of the document, and then having two completely separate sections focusing on the Magnetic response and then the Thermal response rather than their content being included amongst various other sections. The Chair asked if there was any discussion concerning the proposed reorganization but there was none noted.

The WG Vice-Chair then presented an overview of proposed modifications and updates, noting that the industry has made advancements and has learned much since the initial publication of the document since quite a significant number of transformer studies have now been performed, and there is a need to incorporate this new information into the Guide. This material had been circulated to the WG prior to this meeting. Some highlights from the Vice Chair's discussion include:

- that modelling techniques are much improved from when the original document was written such that many of the figures in the current guide show effects to be more than actual occurs, reflecting the more conservative approach used in the development of the original content due to the tight time constraint existing at the time (specific content discussed as included Figure 5, Figure 6, Table 1, Figure 19, Figure 21, Figure 22, and Figure 23).
- that shell form transformer behavior has been further studied and calculations improved, including tank temperature heating at different DC current levels
- that the GIC signature in the current guide should be replaced with the NERC TPL-007 GIC signature (then what to do with the GIC signature in the current IEEE Guide, such as moving to an Annex, will need to be determined)
    - An attendee noted that users need the complete data file rather than just a graph, to which the VChair noted that such data file had been provided to utilities by their RTO.

- adding a real example of a utility's fleet GIC susceptibility assessment using the indexing/categorizing method of section 8 of the published Guide might be beneficial to users
- input from manufacturers is requested.

There was a discussion concerning the type of information related to the modeling techniques themselves that should be included in the Guide. It was noted that specific modeling techniques that companies develop tend to be proprietary in nature, cannot be overgeneralized, and wouldn't be able to be included in a Guide, but that some high-level modelling methodology might be considered for inclusion. This might include discussion of some of the more impacting or significant parameters and their influence.

The current, published version of the Guide had been circulated to the WG prior to this WG meeting to begin collecting suggestions for needed revisions and additional content to the Guide. The collection of the revisions proposed by the Vice-Chair were also circulated to the WG to begin soliciting thoughts and comments. The WG officers have responded to reviewer comments received thus far, and the comments and responses have begun to be consolidated into spreadsheets for tracking. These will be posted to the WG's area of the SC website.

The VChair responded to a question by a WG Member that the impact of GIC on oil temperature during a GMD event is negligible since the GIC signature is characterized by short duration pulses.

The Chair made a call for participants to provide and contribute relevant data to further assist in development of the new and/or revised content.

The Chair also made a call for participants to volunteer to assist in the work on expanding the Background section content if interested in contributing.

Under New Business, a WG Member noted the need to discuss Equation 1, to which the Chair requested an associated comment be submitted by email as a follow up item for review and discussion.

The next planned meeting of the WG will be during the Fall Transformers Committee meetings, scheduled to be held in Milwaukee, however, the Chair noted that intermediate, virtual meetings could potentially be scheduled but that proper notification of such would be transmitted.

The meeting adjourned at its scheduled ending time of 12:05 pm central time.

Respectfully Submitted,
Scott Digby, WG Secretary

Role	First Name	Last Name	Affiliation
Chair	Daniel	Blaydon	Baltimore Gas & Electric
Vice-Chair	Ramsis	Girgis	Hitachi ABB Power Grids
Secretary	Scott	Digby	Duke Energy
Member	Hugo	Avila	Hitachi ABB Power Grids
Member	Suresh	Babanna	SPX Transformer Solutions, Inc.
Member	Jeff	Benach	Consultant
Member	Mats	Bernesjo	Hitachi ABB Power Grids
Member	Enrique	Betancourt	Prolec GE
Member	William	Boettger	Boettger Transformer Consulting LLC
Member	Eric	Doak	D4EnergySolutions LLC
Member	Hakim	Dulac	Qualitrol Company LLC
Member	Anthony	Franchitti	PECO Energy Company
Member	Ismail	Guner	Hydro-Quebec
Member	Gary	Hoffman	Advanced Power Technologies
Member	Saramma	Hoffman	PPL Electric Utilities
Member	Akash	Joshi	Black & Veatch
Member	Kurt	Kaineder	Siemens Energy
Member	Stacey	Kessler	Basin Electric Power Cooperative
Member	Zan	Kiparizoski	Howard Industries

Member	Moonhee	Lee	Hammond Power Solutions
Member	Xose	Lopez-Fernandez	Universidade de Vigo
Member	Kumar	Mani	Duke Energy
Member	Vinay	Mehrotra	SPX Transformer Solutions, Inc.
Member	Thomas	Melle	HIGHVOLT
Member	Martin	Munoz Molina	Orto de Mexico
Member	Ali	Naderian	Metsco
Member	Anastasia	O'Malley	Consolidated Edison Co. of NY
Member	Nitesh	Patel	Hyundai Power Transformers USA
Member	Patrick	Picher	Hydro-Quebec IREQ
Member	Ion	Radu	Hitachi ABB Power Grids
Member	Afshin	Rezaei-Zare	York University
Member	Steven	Schappell	SPX Transformer Solutions, Inc.
Member	Markus	Schiessl	SGB
Member	Eric	Schleismann	Southern Company Services
Member	Cihangir	Sen	Duke Energy
Member	Hemchandra	Shertukde	University of Hartford
Member	Marc	Taylor	Cogent Power Inc.
Member	Mark	Tostrud	Dynamic Ratings, Inc.
Member	Jason	Varnell	Doble Engineering Co.
Member	Kiran	Vedante	Ritz Instrument Transformers
Member	Jos	Veens	SMIT Transformatoren B.V.
Member	Rogerio	Verdolin	Verdolin Solutions Inc.
Member	David	Wallach	Duke Energy
Member	Joe	Watson	JD Watson and Associates Inc.
Member	William	Whitehead	Siemens Energy
Member	Trenton	Williams	Advanced Power Technologies
Member	Waldemar	Ziomek	PTI Transformers
Guest	Kayland	Adams	SPX Transformer Solutions, Inc.
Guest	Edmundo	Arevalo	Bonneville Power Administration
Guest	Gilles	Bargone	FISO Technologies Inc.
Guest	Olle	Benzler	Megger
Guest	Thomas	Blackburn	Gene Blackburn Engineering
Guest	Jeremiah	Bradshaw	Bureau of Reclamation
Guest	John	Crouse	Roswell Alliance
Guest	Marco	Espindola	Hitachi ABB Power Grids
Guest	Evgenii	Ermakov	Hitachi ABB Power Grids
Guest	Roger	Fenton	Fenton Solutions
Guest	Raymond	Frazier	Ameren
Guest	Jeffrey	Gragert	Xcel Energy
Guest	Bill	Griesacker	Duquesne Light Co.
Guest	Thomas	Hartmann	Pepco Holdings Inc.
Guest	Roger	Hayes	General Electric
Guest	Derek	Hollrah	Burns & McDonnell
Guest	Philip	Hopkinson	HVOLT Inc.
Guest	Paul	Jarman	University of Manchester
Guest	Anton	Koshel	Delta Star Inc.
Guest	Axel	Kraemer	Maschinenfabrik Reinhausen
Guest	Donald	Lamontagne	Arizona Public Service Co.
Guest	Aleksandr	Levin	Weidmann Electrical Technology
Guest	Balakrishnan	Mani	Virginia Transformer Corp.
Guest	Rogelio	Martinez	Georgia Transformer
Guest	James	Mciver	Siemens Energy
Guest	Susan	McNelly	Xcel Energy
Guest	Zachary	Millard	Great River Energy
Guest	Paul	Morakinyo	PSEG
Guest	Emilio	Morales-Cruz	Qualitrol Company LLC
Guest	Anthony	Natale	HICO America
Guest	Frank	Neder	Trench Germany GmbH
Guest	Kristopher	Neild	Megger
Guest	Brady	Nesvold	Xcel Energy
Guest	Sanjay	Patel	Royal Smit Transformers
Guest	Brian	Penny	American Transmission Co.

Guest	Christoph	Ploetner	Hitachi ABB Power Grids
Guest	John	Reagan	Oncor Electric Delivery
Guest	Larry	Rebman	EMLS, Inc.
Guest	Perry	Reeder	SPX Transformer Solutions, Inc.
Guest	Mickel	Saad	Hitachi ABB Power Grids
Guest	David	Sheehan	HICO America
Guest	Adam	Smith	Commonwealth Associates, Inc.
Guest	Brad	Staley	Salt River Project
Guest	Kerwin	Stretch	Siemens Energy
Guest	Troy	Tanaka	Burns & McDonnell
Guest	Vijay	Tendulkar	Power Distribution, Inc. (PDI)
Guest	Kannan	Veeran	Georgia Transformer
Guest	Nicholas	Walder	EATON Corporation
Guest	Michael	Warntjes	American Transmission Co.
Guest	Alan	Washburn	Burns & McDonnell
Guest	Jeffrey	Wright	Duquesne Light Co.
Guest	Peter	Zhao	Hydro One