Annex K Power Transformers Subcommittee

March 28, 2017
Pittsburgh, PA
Meeting Time: 1:30 p.m.

Chair: Bill Griesacker
Vice Chair: Kipp Yule
Secretary: Alwyn VanderWalt

K.1 Meeting Attendance

The Power Transformers Subcommittee met on Wednesday, March 28, 2017, at 1:30 PM. The attendance recorded indicated that 64 out of 112 members of the subcommittee were in attendance; a quorum at the meeting was achieved. A total of 191 individuals attended the meeting; 22 guests requested membership.

K.2 Approval of previous meeting minutes, and meeting agenda

The agenda was presented but only provisionally approved until a quorum could be obtained.

Once a quorum was reached, the Chair requested a motion to approve the Agenda and the Fall 2017 Louisville meeting minutes. A motion was made by Dan Sauer to approve by unanimous consent both the agenda and the Fall 2017 meeting minutes. The motion was seconded by Dan Blaydon. There were no objections and both the agenda and previous meetings minutes were therefore approved.

K.3 Chair's Remarks

The chair stated that Kipp Yule will be stepping down as Vice-Chair, and requested names of volunteers to fill the vacancy.

K.4 Working group reports

K.4.1 Revision of C57.12.10 IEEE Standard Requirements for Liquid-Immersed Power Transformers – Gary Hoffman

The document was approved by RevCom at their December meeting. Currently the document is being edited.

K.4.2 Revision of C57.93 IEEE Guide for Installation and Maintenance of Liquid-Immersed Power Transformers – Mike Lau

See details of meeting minutes in Attachment K.4.2. Mike Lau reported that the document is out for balloting. A ballot resolution group was formed to address ballot comments. The objective is to report back with a final document by August 1. The chair will also apply for a ballot extension in case the working group is unable to resolve all ballot comments before year end, when the PAR expires.

K.4.3 Revision of C57.125 Guide for Failure Investigation, Documentation, Analysis and Reporting for Power Transformers and Shunt Reactors – W. Binder

No meeting was held.

K.4.4 TF to Compare C57.131-2012 Standard for Load Tap Changers and IEC 60214-1 ED 2.0 for consideration of recommending adoption of IEC standard (Also WG 60214-2 Tap-Changer Application Guide) - Craig Colopy

TF Comparison of IEC 60214-1 and IEEE C57.131: See details of meeting minutes in Attachments K.4.4.1. Craig Colopy reported that a meeting was held but that a quorum was not achieved. The current PAR which expires Dec. 2020, is for adoption of IEC 60214-1. The chair explained that the IEC does not allow the IEEE to adopt an IEC standard. The result is that the current PAR will be cancelled and reissued as a new joint revision of IEC 60214-1.

WG TC Application Guide IEC 60214-2: See details of meeting minutes in Attachments K.4.4.2. Craig Colopy reported that a meeting was held during which a quorum was reached. The chair reported that there was a 100% approval from IEEE recirculation ballot, but that the document is being held back from IEEE SA submission until IEC CDV process is completed. The IEC 60214-2 CDV will be introduced to the member countries the week of March 26, 2018. After IEC CDV comments are reviewed and addressed by members of the joint revision team, the IEEE ballot is likely to be re-circulated to ensure approval for any major technical changes.

K.4.5 C57.140 Guide for the Evaluation and Reconditioning of Liquid-Immersed Power Transformers – Paul Boman

No meeting was held.

K.4.6 C57.143 – Guide for Application of Monitoring Equipment to Liquid-Immersed Transformers and Equipment – Mike Spurlock

See details of meeting minutes in Attachment K.4.6. Mike Spurlock reported that a meeting was held and that a Quorum was reached. Various topics were discussed, which included a presentation by Emilio Morales on Chapter 5 of the guide, which would be distributed to members after the meeting. Following general discussion, a motion was made to change the scope of the guide to remove language stating that the guide does not cover interpretation of monitoring results. The motion was not approved. The members subsequently voted not to include a chapter to address data analytics in the guide.

K.4.7 Revision of C57.148 Guide for Control Cabinets for Power Transformers

See details of meeting minutes in Attachment K.4.7. Joe Watson reported that a meeting was held and a quorum was reached. The TF reviewed comments for section 6 and 7 of the document following a straw ballot earlier this year. Following debate about comment #10 of the straw ballot regarding control cabinet drawing requirements, a motion was approved to form a new task force to create a new section for this in the guide.

K.4.8 Revision of C57.150 Guide for the Transportation of Transformers and Reactors Rated 10,000 kVA or Larger – Greg Anderson

See details of meeting minutes in Attachment K.4.8. A meeting was held and a quorum was reached. The WG reviewed the status of related guides such as CIGRE and other documents related to the topic to compare the contents of those documents in relation to this guide. During

this meeting a guest presentation was delivered that covered industry trends regarding impact monitoring and tracking.

K.4.9 Development of PC 57.153 Guide for Paralleling Transformers - Tom Jauch

No meeting was held.

K.4.10 Development of PC57.156 Guide for Transformer Tank Rupture Mitigation of Liquid-Immersed Power Transformers and Reactors - Peter Zhao

Working group did not meet.

K.4.11 Development of PC57.157 Guide for Conducting Functional Life Tests for De-Energized Tap Changer Contacts - Phil Hopkinson

Working group did not meet.

K.4.12 Task Force on V/Hz Curve – Joe Watson

Joe Watson reported that the Task Force's first meeting was held, so all attendees who requested membership were granted membership.

A brief presentation was made on the need for the TF and problems with existing V/Hz curves used by manufacturers and users as well as engineers who need to determine correct relay settings.

Peter Zhao, Jin Sim and Drew Welton all expressed agreement for a need to develop better curves and standardize on the process so such curves would be similar from one manufacturer to the next.

Joe Watson discussed the assignment for the TF and that the TF may decide to develop a new document or that it may just identify a few areas that should be covered in other existing standards.

Two sub-groups were formed, one to focus on applications (protective relaying) and another to focus on transformer V/Hz capabilities from a design perspective.

K.4.13 Task Force on Condition Assessment Guide – Brain Sparling

See details of meeting minutes in Attachment K.4.13. A meeting was held but a quorum was not reached with only 22 of 73 members present. There was vigorous debate over the scope of the guide, and specifically whether it should include asset management as a topic. Several arguments were made both for and against including asset management. The chair concluded that asset management should not be included, but sine there was not a quorum present no motion could be voted on to change the scope of the guide. More discussion will be needed on the topic during the next meeting.

K.5 Old Business

None

K.6 New Business

C57.153 - Standard requirements for phase shifting transformers is due for renewal. A Task Force will be formed to identify the scope and which sections of the standard need to be revised. The chair solicited volunteers to help with this.**Adjournment**

The meeting was adjourned at approx. 2:09 pm

K.7 Adjournment

The meeting was adjourned at 2:09 pm

K.8 Attachments –Working Group Meeting Minutes and Agenda

Attachment K.2 – F17 PTSC Agenda
Attachment K.4.2 – PC57.93 Installation Guide
Attachment K.4.4.1- WG 60214-1_C57.131 Tap Changers Part 1 Performance requirements
Attachment K.4.4.2 – WG 60214-2 IEC Tap Changer Part 2 Application Guide
Attachment K.4.6 – C57.143 Monitoring Guide
Attachment K.4.7 – PC57.148 Control Cabinets
Attachment K.4.8 – C57.150 Transportation Guide
Attachment K.4.12 – Task Force on V/Hz
Attachment K.4.13 – Task Force on Condition Assessment Guide

Attachment K.2

AGENDA

Power Transformers Subcommittee
IEEE PES Transformers Committee
Wednesday, March 28, 2018, 1:30-2:45 PM
Omni William Penn Hotel; Pittsburgh, Pennsylvania, USA
Bill Griesacker – Chair, Kipp Yule – Vice Chair, Alwyn VanderWalt – Secretary

1. Call to order
2. Distribution of attendance sheets
3. Determine quorum
4. Approval of previous meeting minutes
5. Chair remarks
6. Working Group and Task Force reports
    a. WG Revision to C57.12.10, Standard Requirements .....G. Hoffman
    b. WG Revision to C57.93, Installation Guide .....M. Lau
    c. WG 60214-1-57-131, Tap Changers (on hold).....C. Colopy
    d. WG Tap Changer Application Guide IEC 60214-2 .....C. Colopy
    e. WG Revision of C57.143, Monitoring Guide .....M. Spurlock
    f. WG Revision of C57.148, Control Cabinet Standard .....J. Watson
    g. WG Revision of C57.150, Transportation Guide .....G. Anderson
    h. TF Transformer V/Hz Curves .....J. Watson
    i. TF Transformer Condition Assessment Guide .....B. Sparling
7. New business
    a. IEEE C57.135 Phase Shifting Transformers, joint IEC/IEEE Standard - document revision will start in IEC. Task force to be formed to determine the scope for revising the standard.
8. Old business
9. Adjournment

Attachment K.4.2

Working Group for Installation of Power Transformers C57.93
Monday, March 26, 2018
1:45 – 3:15 PM
Omni Penn CL(A)
Pittsburgh, PA

Chairman Mike Lau
Vice Chairman Alwyn VanderWalt
Secretary Scott Reed

The meeting was called to order at 1:48 pm by Chair Mike Lau.

There were 30 of 44 members present. There were 36 guests and 39 visitors. A membership quorum was achieved.

Agenda

1. Attendance Roster Sign In / Quorum Check
2. Patent Call
3. Approval of the Agenda
4. Approval of the Fall 2017 minutes
5. Ballot
   a. Draft 1.5
   b. Formation of the Ballot Resolution Group (Volunteers needed)
6. Unfinished Business
7. New Business
8. Adjournment

Attendees introduced themselves.

The Fall 2017 Minutes were unanimously approved. The Spring 2018 Agenda was unanimously approved.

Chairman Lau posted the Patent Claim. No notifications or comments were received.

Chair's Remarks:
Chairman Lau discussed there are 132 individuals registered to vote. The ballot closes April 18th, 2018. So far, there have been 28 responses; therefore, 71 more responses are required to achieve 75% return requirement.

It was decided to prepare a Ballot Resolution Group now. The following members volunteered:

Deanna Woods	Joe Watson
Wally Binder	Kevin Sullivan
Pat Rock	Alan Sbravati
Stephanie Denzer	Don Dorris
Mike Lau	Alwyn VanderWalt

Scott Reed

PAR closes at the end of the year. Need to resolve and ballot by October 15, 2018. As such, Joe Watson made a motion that the ballot resolution group be granted authority to finalize the changes to the guide on behalf of the working group and to present the revised guide to the working group by August 1, 2018. Wally Binder seconded the motion and it unanimously passed.

Jim Graham suggested we apply for a PAR extension now so Mike will pursue. The extension can always be withdrawn later.

The meeting was adjourned at 2:24 pm.

Chair: **Craig A. Colopy** **Vice-Chair** **Axel Kraemer**

Secretary **Adam M. Sewell**

Current Draft Being Worked On: NA **Dated:** **NA**

PAR Expiration Date: December 31, 2020

Meeting Date: **27 March 2018** **Time:** **8:00 to 9:15**

Location: **Pittsburgh, PA**

Attendance:		
	Members	**17**
	Guests	**60**
	Guests Requesting Membership	**13**
	Total	**77**

Meeting Minutes / Significant Issues / Comments:

1. Meeting was called to order at 8:00am, March 27, 2018.
2. Introductions were made and attendance sheets were passed out.
3. Call for patents were made with no response from any attendees.
4. Quorum was check – less than 50% of members attending per meeting count (11/34)
    a. No official business could be conducted
5. Chairman reviewed agenda and previous minutes from New Orleans
6. Chairman discussed previous actions and next steps for this WG
    a. Current PAR, expiring Dec. 2020, is for adoption of IEC 60214-1. Due to being a global organization not affiliated with the USNC, IEC doesn't allow IEEE adopting its standards for use in creating an IEEE standard. ANSI recently notified IEEE of a change to the ANSI/IEEE license agreement for the sale of National adoptions of ISO and IEC Standards. This change is mandating that an adopted standard be labeled as a "U.S. national" standard and must include a U.S. national forward and national branding on each page. Also, the adopted standard could only be actively sold/marketed in the nation it was adopted in. Due to these reasons, IEEE is no longer using ANSI to adopt ISO or IEC standards due to itself being a global organization.

    b. Current PAR will be cancelled and re-issued as a joint revision of IEC 60214-1, once IEC initiates the process. IEEE Vice-chair and IEC Convenor, Axel Kraemer will work with IEC in establishing a start date.
7. Next meeting is planned for October 2018-Jacksonville, FL Transformers Committee Meeting

8. Meeting closed at 8:30am.

Submitted by: Craig A, Colopy Date: 3/28/2018

Chair:	**Craig A. Colopy**	**Vice-Chair**	**Axel Kraemer**
Secretary	**Adam M. Sewell**		

Current Draft Being Worked On: 14/913/CD

PAR Expiration Date: December 31, 2018

Meeting Date:	**27 March 2018**	**Time:**	**13:45 to 15:00**
Location:	**Pittsburgh, PA**		

Attendance:	**Members**	**18**
	Guests	**34**
	Guests Requesting Membership	**6**
	Total	**52**

Meeting Minutes / Significant Issues / Comments:

9. Meeting was called to order at 1:45 pm, March 27, 2018.
10. Introductions were made and attendance sheets were passed out.
11. More than 50% WG members were in attendance so a quorum was established
12. Call for patents were made with no response from any attendees.
13. Agenda for this meeting was unanimously approved.
    a. Motion-Marcos Ferreira, Marcus Stank second
14. IEEE Minutes from October 2018 in Louisville were unanimously approved.
    a. Motion-Dave Geibel, second- Marcos Ferreira
15. Chairman comments
    a. 100% approval from IEEE recirculation ballot
        i. Holding back IEEE SA submission until IEC CDV process is completed
    b. IEC 60214-2 CDV to be introduced to the member countries the week of March 26, 2018
        i. After IEC CDV comments are reviewed and addressed by members of the joint revision team, the IEEE ballot is likely to be re-circulated to ensure approval for any major technical changes.
16. Next meeting scheduled for October 2018 in Jacksonville, FL.
17. Meeting adjourned at 2:10pm.
    a. Motion- Marcos Ferreira, second-Dave Geibel

Submitted by: Craig A, Colopy Date: 3/28/2018

Revision to C57.143 – "Guide for Application of Monitoring Equipment to Liquid-Immersed Transformers and Components"

Transformer Monitoring Working Group

Monday, March 26, 2018
Pittsburgh, PA, USA
Minutes of WG Meeting

The meeting was called to order at 3:15 pm by Chair Mike Spurlock. Secretary Mark Cheatham was also present.
This was the third meeting of the working group, rosters were circulated and members asked to stand to determine quorum, quorum was reached with 44 of 81 members present. The attendance for the meeting was as follows:

Number of Members in Activity = 81
Number of Members Present = 44
Quorum Present = 54.3%
Number of attendees = 110
Attendees requesting Membership = 21 (To be reviewed based on Participation to date)

PAR Status: PAR for a Revision to an existing IEEE Standard
Type of Project: Revision to IEEE Standard C57.143-2012
PAR Request Date: 19-Nov-2016
PAR Approval Date: 17-Feb-2017
PAR Expiration Date: 31-Dec-2021

The Agenda for the meeting was reviewed as seen below.

MEETING AGENDA

A. Welcome & Introduction
B. Call for Patent Disclosure
C. Roster Circulation
D. *Quorum Roll Call*
E. Chair Remarks
F. New Members – Indicate on Roster
G. Call for approval of Fall 2017 Meeting Minutes (Louisville, KY)
H. Working Group Activities
    1. Discuss progress to date and plan going forward for Chapter 1 "Overview".
    2. Emilio presentation on his team's progress on Chapter 5 "Monitored Parameters".
    3. Announce new team for Chapter 6 "Monitoring Systems and Equipment".
    4. Call for volunteers to assist with current teams.
    5. Moving ANNEX 'E' into a new Chapter.

6. Moving ANNEX ‘D’ into a new Chapter.

I. New Business

1. Discuss possible addition of a new Chapter on Data Analytics.

Mike Spurlock asked for any patent claims against C57.143 to be raised by attendees, none were raised.

Mike Spurlock reviewed the Par Status and Scope and Purpose for the PAR with the working group.

Emilio Morales presented Team Progress on Chapter 5, Monitored Parameters. This presentation will be provided to Members and guests following the meeting. Emilio asked the group to contact him to indicate if any sensors missing from the document that should be considered for inclusion.

Mike Spurlock introduced Poorvi Patel as lead of Chapter 6 review team. Poorvi and team planned to have first meeting on 3-26 at 5:00pm. Will look for this team to review consideration of moving Annex E and D to Chapter 6 or possibly their own chapters. This team will provide and update at the Jacksonville Meeting in the fall.

Luiz Cheim questioned optical temperature measurement being referred to as “Direct Temperature Measurement”. Emilio Morales indicated that this is in agreement with CIGRE, consensus among the group was to leave as is in the document.

After confirmation of quorum Mike Spurlock requested motion to approve the meeting minutes from the Fall 2017 meeting in Louisville. Joe Watson motioned for approval, Roger Verdolin seconded. Minutes were approved.

Mike Spurlock reviewed New Business, beginning with a proposal to add a chapter on Data Analytics which possibly would include transformer fleet monitoring. This was discussed extensively by the group, some comments from the group noted below.

Luiz Cheim discussed how Cigre used high level general examples to touch on data analytics in their monitoring guide and cautioned against going into to much details without getting into Patent issues.

Marc Foata expressed concern attempting to add this chapter on data analytics could cause a lot of work that would ultimately not be achievable by the group.

Joe Watson suggested that the newly formed TF on Condition assessment was better suited to take on Data Analytics and that this was outside of the scope of the current C57.143 working group.

Poorvi Patel suggested that at a minimum consider adding high-level general discussion to the document similar to Cigre Document.

Claude Beauchemin suggested high-level academic/generic mention of data analytic methods to review data be noted in the guide.

Jim Dukarm suggested an article in IEEE Transactions addressing data analytics was more appropriate and better suited to cover data analytics.

Joe Watson suggested that consideration be given to discussion in the document on collection of data for single device and fleet level data collection and transfer for analytics, and avoiding getting into the details of analytics to be performed.

George Forest suggested listing measured parameters by monitoring devices in an Annex and adding a note to the users that there are analytics available to aid in the interpretation of results.

Following general discussion and comments a motion was proposed by Luiz Cheim to revise scope to remove "This guide does **not** cover interpretation of monitoring results." And add a data analytics section/chapter. After continued discussion this motion was withdrawn, the members present were asked to vote on adding a chapter or Annex Covering Data Analytics. 5 of 44 members present voted yes, majority not in favor of adding a chapter or annex to address Data Analytics.

There was also discussion on moving Annexes D and E into the main body of the guide. This will be looked into further by the review teams.

Mike Spurlock requested any attendees interested in volunteering for participating in teams working on current Chapter reviews for revision see him after the meeting.

A motion to Adjourn was given by Marcos Ferreira and seconded by Joe Watson, Meeting adjourned at 4:30pm.

Revision of C57.148 Standard for Control Cabinets for Power Transformers
Joe Watson: Chair, Weijun Li: Vice-Chair, JF Collin: Secretary

The working group met at 11:00 AM on Monday 03/26/2018 in Conference Center Room A at the Omni William Penn hotel in Pittsburgh, Pennsylvania. 45 attendees were recorded, including 18 of the 29 members (62%). Quorum was reached. It was the fourth official Working Group meeting for this project. The complete attendance record is available in the AMS System. 3 guests requested membership.

As required by the main committee, the Patent question was asked at the beginning of the meeting. No essential patents were claimed. Motions were proposed by Gary Hoffman and seconded by Wallace Binder to approve the Louisville Fall 2017 meeting minutes and the Spring 2018 meeting agenda.

The WG chairman asked Shankar Nambi, leader of TF Review of Sections 6-7, to discuss the task force comments.

In response to Comment #10 regarding control cabinet drawing requirements, the TF suggested forming another study group/TF to create a new section to cover drawing requirements. The intent is to define drawing requirements and furnish necessary example drawings. A motion was proposed by Ryan Musgrove and seconded by Shankar Nambi. The WG unanimously approved the forming of the new TF. Ryan Musgrove will lead this task force and will report the progress in work to the WG at the next meeting. The following people volunteered for this TF

- Kris Zibert
- Pugal Selvaraj
- Joe Watson
- Shankar Nambi
- Weijun Li
- Paul Dolloff
- Nicolas Blais
- JF Collin

Regarding Comment #74 about device numbering, Section 6.1 will be revised to read "Devices shall be numbered on drawings and wiring designated with wire markers in accordance with IEEE Std. C37.2" for clarity.

In response to Comment#84 regarding NEMA ratings, the TF agreed that NEMA 3 could be the minimum requirement instead of NEMA 3R because of protection against windblown dust and rain. The WG also agreed that other NEMA or IEC designations may be specified by the user for indoor locations or special environments.

After reviewing the comments, a motion was made by Gary Hoffman and seconded by Patrick Rock to accept the changes suggested by both Task Forces (TF Review of Section5 and TF Review of Sections 6-7). The motion was approved by the WG. All suggested changes will be incorporated into the revised document. The revised document will be made available to the WG for review prior to the next meeting.

The group will meet again in Jacksonville, Florida in October 2018. The meeting was adjourned at 12:15 PM.

C57.150 – IEEE Guide for Transportation of Transformers and Reactors
Tuesday, March 27, 2018
Pittsburgh, PA
Minutes of WG Meeting

The meeting was called to order at 11:10 am by Chair Greg Anderson. Vice-Chair Ewald Schweiger and Secretary Marnie Roussell (writer of Minutes) were also present.

There was a total of 80 people present, 23 members, 57 guests, and 3 guest requesting membership. Attendance was taken utilizing only the RFID System. Paper rosters were not passed around, so any guests desiring membership were asked to contact one of the WG leaders.

Agenda

1. Welcome
2. Patent Issues
3. Determination of Quorum (determined by RFID system)
4. Approval of the Minutes
5. Brief History of WG
6. Timeline of Project
7. Review of assigned work
8. Presentation by Kraig Nunn, Shockwatch

A call for essential patent claims was made. No patent claims were identified.

Introductions of the Chair, Vice Chair, and Secretary were made. Attendees were asked to introduce themselves and indicate their affiliations when making comments or asking questions.

There were no objections to the agenda as identified above.

Minutes of the Spring 2017 Meeting and Fall 2017 Meeting were distributed for review earlier via email. The minutes were approved with a motion by Dave Wallach, and seconded by Kenneth Skinger.

List of Meeting Attendees is provided below. Those identified with an asterisk are WG Members in attendance. Those requesting membership are noted with two asterisks (**)

Hamid Abdelkamel*
Joseph Adkins
Richard Amos
Gregory Anderson*
Cheryl Basel
Christopher Baumgartner
Enrique Betancourt
Wallace Binder*
Dennis Blake
Mike Bohonek
Wen-Ping Chu
Florian Costa
Antonio Di Biase
Rodolfo Diaz
Paul Dolloff
James Fairris*
Eduardo Garcia*
James Gardner
Jeffrey Gragert
James Graham
Bill Griesacker
Calvin Ho
Jill Holmes
Carl Hummel
Toby Johnson
Gael Kennedy
Stacey Kessler*
Michael Lau*
Antoine Lecomte
Parry Lively
Mario Locarno*
Kumar Mani
Rogelio Martinez
Robert Mayer
Susan McNelly*
David Murray
Ryan Musgrove
Paul Mushill
Shankar Nambi

Anthony Natale
Jason Neal
Joe Nims
Kraig Nunn
George Partyka
Bipin Patel
Brian Penny
Eduardo Ramirez Bettoni
Rakesh Rathi**
John Reagan
Marnie Roussell*
Eric Schleismann
Alfons Schrammel*
Wesley Schrom
Ewald Schweiger*
Cihangir Sen
Samuel Sharpless**
Mark Shem-Tov**
Yukiyasu Shirasaka
Andre Simons*
Kenneth Skinger*
Andy Speegle
Andrew Steineman
Roy Su*
Kevin Sullivan*
Yunhan Sun
Troy Tanaka
Robert Thompson
Olivier Uhlmann*
Alwyn VanderWalt*
Rogerio Verdolin*
Sukhdev Walia
David Wallach*
Joe Watson*
Bruce Webb
Matthew Weisensee*
Daniel Weyer
Jeffrey Wright
Tzi Han Yeh
Chun-Sheng Yu
Kris Zibert*

9. History

Greg provided a brief history of the document and the timeline for the revision. He indicated we need to be done at least a year prior to the 12/31/2022 expiration of the PAR.

10. Revision Topics/Assignments

Greg reviewed the first several assignments.

Assignments Chart		
Task	**Brief Scope (see meeting minutes)**	**Assigned To (need to assign a leader to each task)**
CIGRE Guide	Compare CIGRE document to our Guide.	H. Abdelkamel, M. Locarno, V. Krishnamurthy, S. Nambi, E. Schweiger, B. Webb
Swim Lanes	Add: helpful "matrix/table" to Guide	D. Wallach
Impact Recorders	Enhance section on impact recorders	S. Nambi, K. Nunn, R. Rathi, J. Watson
Internal Bracing	Add guidance (careful, a design issue!)	R. Verdolin, J. Watson
External Bracing, Lashing, etc.	Provide some guidance	Kris Zibert
Exceeding Impact Limits	Add: What to do if specified impact limits are exceeded.	R. Verdolin, J. Watson
Tests **	Compare Tests, C57.150 vs. C57.152	W. Binder, J. Watson
Air Pressure	Add: How internal air pressure changes w/ambient temperature.	J. Arteaga
SFRA	Enhance section on SFRA	G. Anderson, R. Su, K. Sullivan
C57.93, Installation Guide	Review C57.93 for any overlap and conflicts.	J. Sen
Shipping w/Natural Ester Fluids	Add section of unique issues	(need)
Mobile Subs	Add section of unique issues	(need)
** - Work submitted earlier. Will report to WG in Pittsburgh.		

CIGRE Guide

Ewald Schweiger summarized an initial review of the CIGRE Guide on Transformer Transportation, WG A2 42 (CIGRE Proceedings 673). He noted that document is 3 times the size of our guide. The document was reviewed, and a more thorough review will be presented at the Fall 2018 Meeting.

Swim Lanes

Dave Wallach presented the proposed “Swim Lanes” type matrix at the beginning to lay out the various transportation phases and to reference the appropriate clauses. Dave provided a first draft example of the concept that is attached at the end of the minutes.

Impact Recorders

Kraig Nunn reviewed impact recorders in a presentation on industry trends later in the meeting.

Greg suggested using inexpensive “one-shot impact indicators on essential crated components such as bushings.

Bracing

Kris Zibert volunteered to develop the section on Internal Bracing.

Greg suggested including a section on "What to do next, if something goes wrong", and he also suggested combining the internal and external bracing sections.

Joe Watson suggested a performance section for internal and external bracing

Sue McNelly requested a section on guidance on bracing for inclines.

Greg briefly reviewed a case study on the performance of an indirect lashing where the bottom lashing was missing.

Field Tests

Wally Binder compared Clause 10 of our guide (the section on field tests) with the Installation Guide C57.152. It was determined that there was no need to expand on the interpretation the of field tests or "how to" section because it is in C57.152, and it refers to C57.150.

Joe Watson and Wally Binder will continue to review the tests portion and identify any items that should be included. It was noted that C57.93 is going out to ballot soon, so a comparison could not be made at this time.

Remaining items will be discussed at the next meeting.

New Business

There was no new business

Special Presentation: "Industry Trends in Transportation Impact Monitoring & Tracking", by Mr. Kraig Nunn, Shockwatch

11. The meeting was adjourned at 12:15 pm with a motion by Bruce Webb, and seconded by Wally Binder. The WG plans to meet at the Fall 2018 Meeting in Jacksonville, Florida.

Greg Anderson
WG Chair

Ewald Schweiger
WG Vice Chair

Marnie Roussell
WG Secretary

Minutes

Task Force on V/Hz
Pittsburgh, PA – March 27, 2018
Kipp Yule Chair, Dr. Ramsis Girgis Vice-Chair, Joe Watson Secretary

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The TF met at 3:15 PM on March 27, 2018 in the Frick Room on the CL Floor of the Omni William Penn Hotel.

This was the first official meeting of this task force and all attendees who requested membership were added as members. A quorum was present, but no issues were voted on. There were 25 attendees, of which 10 attendees requested membership. Attendance will be entered into the AMS system on the Transformers Committee website. The Agenda was reviewed and no objections identified, prior minutes are not applicable. There was a call for essential patent claims made. No patents were identified.

Dr. Ramsis Girgis gave a brief presentation on the need for the TF and problems with existing V/Hz curves used by manufacturers and users as well as engineers who need to determine correct relay settings. He showed that there are a few older curves that are similar, but all were based on the time it took for the hot spot on a tie plate to reach 180°C; which is the criterion for short overload conditions (< 30 minutes). This has a number of flaws, namely:

- The V / Hz curve is to cover high levels of over-excitation for very short durations of seconds, or 10s of seconds, but at the same time using a temperature limit that apply to steady state conditions.
- The curves are based on measurements for tie plates of core form transformers of certain designs and materials but the V/Hz curves have been used for all different kinds of core form transformers and also for shell-form transformers that have T beams and not tie plates.
- Modern transformer designs often utilize high-temperature insulation materials such as high temperature fiberglass or Nomex in these areas.

He indicated the need for the TF to:

- Define standard methods and criteria that manufacturers can use to develop transformer specific V/Hz curves
- Define Temperature – duration requirements that manufacturers need to use to adhere to in developing design-specific V / F Characteristics for their designs

Peter Zhao, Jin Sim, and Drew Welton all expressed agreement for a need to develop better curves and standardize on the process so ~~such~~ curves from different manufacturers would have ~~be~~ similar basis.

Joe Watson discussed the assignment for the TF and that the TF may decide to develop a new document or that it may just identify a few areas that should be covered in other existing standards. He also discussed that the criteria for such curves should be an area between lines and not just a single line because users may have different tolerances for transformer temperatures, especially when the relay protection for many of the types of transformers that can be exposed to V/Hz issues will trip a generation station off line. Also, the design of the plant, such as whether or not a generator breaker is between the GSU and generator, can significantly affect the exposure to V/Hz levels.

Kipp Yule also noted that even after a generator is tripped by a V/Hz relay, if there is no generator breaker, the transformer will continue to have abnormal V/Hz until the generator voltage versus speed reduces by coasting down. Also, V/Hz is a condition that all power plant transformers connected to the generator bus, such as UAT's and Excitation transformers experience, however it is believed that most users only focus on the GSU.

Jin Sim advised that we should review C37.91 to see if V/Hz protection is covered there or if the TF should reference it in any document that the TF may issue.

Two sub-groups were formed, one to focus on applications (protective relaying) and another to focus on transformer V/Hz capabilities (how and what actually establishes the limits of the V/Hz curves provided by the OEMs, such as core design and materials utilized).

Drew Welton volunteered to lead the applications sub-group and Ramsis Girgis was volunteered to head up the sub-group on transformer V/Hz capabilities. Others who would like to work on these groups should contact Drew or Ramsis, or the Chair.

There have been two conference calls in preparation for the first meeting:

The first was held 3 May 2017 and focused on the historic curves discussed above. The consensus is that there is no such generic curve that represents the Volts per Hertz relationship to time that would cause damage to the transformer. Each transformer has its own unique V/Hz limitation curve versus time and users should obtain the specific V/Hz curve for the transformer with regard to setting protective relaying.

The second was held 31 May 2017 with several members of the IEEE PES Relay Committee and explained how the Volts per Hertz curves are used to set the protection relay. This session was arranged by Russ Patterson who had originally asked the PTSC for guidance at the S16 meeting in Atlanta, and curves to be used when reviewing existing transformer installations. Topics discussed will be covered in future activities of the TF, and include gassing in oil, insulation thermal damage, Loaded and unloaded conditions, and both steady state and transient conditions.

It noted there was a prior TF (circa 2004), that looked into the steady state Volts per Hertz characteristics, and the Chair requests copies of any historical notes that could be of assistance in this effort.

Several of the attachments have been used in prior conference calls, referenced in prior status reports or reviewed during this meeting, and are being gathered for reference. The following documents will be posted to the TF's area of the Power Transformer SC's page on the Transformer Committee's website.

- V/Hz Presentation by Dr. Ramsis Girgis 3/27/18
- Overexcitation over time – Chris Ploetner 20041025
- Draft PTSC Position Statement on Volts per Hz
- EPRI Figure 2-15 Short term Overexcitation

The meeting adjourned at 4:30 PM.

Meeting Minutes
Task Force on Condition Assessment
Pittsburgh, PA – March 27, 2018

- The Task Force met at 9:30 AM on March 27, 2018 in the Urban Room on the 17th Floor of the Omni William Penn Hotel with 59 attendees in total with 22 of the 73 WG members present. A quorum was not present
- Call for patents – there were no issues
- The previous minutes were tentatively approved but will need to be presented for approval by email to the members due to the lack of a Quorum
    - The scope presented at the meeting for discussion was "The guide covers condition assessment and asset management methods for oil and ester fluid-immersed power transformers and reactors and their components. The Guide also includes examples of utilizing assessment data to estimate the reliability of individual transformers and reactors or a fleet population of transformers or reactors to enable users and asset managers to identify candidates for the planning of maintenance, refurbishment or replacement activities as well as spare strategies. This Guide does not cover the interpretation of test data that may be covered in other Standards or Guides."
    - After considerable discussion, the scope was shortened to "The guide covers condition assessment of oil and ester liquid-filled transformers and reactors and their components."
- During discussion of the Scope, Don Platts questioned whether asset management should be mentioned in the Scope since the general topic may be covered by other IEEE Standards or Guides, but the purpose of this guide is to collect data to be used for asset management purposes. The Guide will not cover asset management processes in any detail that is covered by any existing IEEE Standards or Guides but should present collected data for use in asset management activities. The group consensus was to remove references to asset management in the document stated scope.
- The shortened scope was approved with 31 out of the 38 members present voting, however, a Quorum was not present so the issue will need to be revisited.
- After the scope was reduced to only a reference to condition assessment, Don Platts questioned whether there was any need for this document because the scope of C57.140, the IEEE Guide for Evaluation and Reconditioning of Liquid Immersed Power Transformers, includes Condition Assessment. A later review of C57.140 shows that "Condition Assessment" is not included in the Scope or Purpose of C57.140, but there is a chapter in that document titled "Condition Assessment and Reconditioning." The text in that chapter of C57.140 may contain some information that should be incorporated or transferred into this new Guide, but it does not cover several areas that are planned for this new document. Another presentation will be made at the next meeting, or a future meeting to further explain the need and planned general scope and purpose of this document
- The question of continuing work on this project was presented to the group and the consensus was that there is a clear need for the document and that we should continue the work. We should however, have more group discussions and a clear understanding by the members of the TF before the official scope and purpose are determined and the PAR is requested.
- The meeting adjourned at 10:45 AM.

Kumar Mani, PE/ Joe Watson