

## **Annex K Power Transformers Subcommittee**

**November 1, 2017**

**Louisville, KY**

**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, November 1, 2017, at 1:30 PM. The attendance recorded indicated that 78 out of 110 members of the subcommittee were in attendance; a quorum at the meeting was achieved. A total of 217 individuals attended the meeting; 33 guests requested membership.

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

The agenda for the meeting was presented and it was approved; see Attachment K.2.

The Chair requested a motion to approve the Spring 2017 New Orleans meeting minutes by unanimous consent. There were no objections to unanimous approval to the meeting minutes and they were therefore approved.

### **K.3 Chair's Remarks**

The chair stated that the subcommittee vice-chair, Kipp Yule could not attend this meeting, and reiterated that Alwyn VanderWalt has agreed to take on the responsibilities of secretary for this subcommittee.

### **K.4 Working group reports**

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

The working group did not hold a meeting. The document is in sponsor ballot. They had three rounds of balloting and three rounds of recirculation. Balloting achieved 93% approval. The document is currently at RevCom.

#### **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 a quorum was achieved with 34 members of 44 total present. The WG discussed the straw ballot results, which included 20 Approve, 11 approve with comments, and 3 disapprove. The WG chair made a motion to move to ballot C57.93 (v1.4), seconded by Joe Watson. There was no discussion on the motion. The motion was unanimously approved.

**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**

See details of meeting minutes in Attachments K.4.4.1.

**TF Comparison of IEC 60214-1 and IEEE C57.131:** Craig Colopy reported that no meeting was held. This was supposed to be the first meeting following the approval of a new PAR, but the meeting was cancelled due to the inability of IEC to deliver a standard to a global organization such as IEEE. IEEE is presently working with IEC to establish a process to work on this document, so it is on hold for now.

**WG TC Application Guide IEC 60214-2:** The TF was scheduled to meet on Thursday 11/2 afternoon and Friday 11/3. The document was sent for IEC CD circulation and IEEE ballot, the results of these were reviewed. The responses will be addressed and the document prepared for the next planned IEC CD circulation and IEEE ballot.

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

Paul Boman reported that no meeting was held. The guide document was approved and released for publication. Thanks to Paul Boman, the working group members, and those involved with the revision of the guide.

**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. A Quorum was achieved. The meeting focused on reviewing the scope of document. A motion to change the scope to include interpretation of monitoring results was defeated. A motion to change the purpose of the document was defeated. The meeting time was focused on reviewing scope and purpose with no motions regarding changes being passed in the meeting.

**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, but that a quorum was not reached. The TF reviewed comments for section 5 of the document following a straw ballot earlier this year.

**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. The minutes for both the Spring and Fall 2017 meetings were submitted. Greg Anderson reported that a meeting was held and a quorum was reached. During this meeting a guest presentation was delivered by a moving and rigging company. Committee leadership is encouraging industry participation to facilitate the updating of the guide. Future activities will include comparing a much lengthier CIGRE guide with the IEEE guide. Review of SFRA, mobile transformers, customs, permitting and various other topics will be included in the revision.

**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**

A formal meeting was not held, and meetings minutes were not submitted. Joe Watson reported that the TF determined that a guide is needed to address V/Hz issues to promote standardization. Joe Watson moved to form a TF to develop a PAR. The motion was seconded by Gail Kennedy. The motion passed with a few abstentions and none opposed.

**K.4.13 Task Force on Condition Assessment Guide – Brian Sparling**

See details of meeting minutes in Attachment K.4.13. Brian Sparling reported that a meeting was held with 122 attendees of which 67 requested membership. The TF scope was discussed, after which a sub-task force with 22 members was created to develop and define scope to be submitted to SC before the S18 meeting. S18 meeting will include discussion about data quality as well as presentation from EPRI about their work in this regard.

**K.5 Old Business**

None

**K.6 New Business**

The joint IEC/IEEE Standard requirements for phase shifting transformers document revision will start in IEC, this is IEEE C57.155. Paul Jarman made a motion to form a TF to determine the scope for revising C57.155. Motion was seconded by Craig Colopy and the motion passed unanimously.

Peter Zhao requested closer cooperation between various WG's and TF's when updating documents so that bushings are considered. .

**K.7 Adjournment**

The meeting was adjourned at approx. 2:20 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.4.4.2 – WG 60214-2 IEC Tap Changer Part 2 Application Guide

Attachment K.4.7 – PC57.148 Control Cabinets

Attachment K.4.8 – C57.150 Transportation Guide

Attachment K.4.13 – Task Force on Condition Assessment Guide

# AGENDA

Power Transformers Subcommittee

IEEE PES Transformers Committee

Wednesday, November 1, 2017, 1:30-2:45 PM Louisville

Downtown Marriott Hotel; Louisville, Kentucky, 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 (no meeting) ..... C. Colopy
  - d. WG Tap Changer Application Guide IEC 60214-2 ..... C. Colopy
  - e. WG Revision of C57.140, Life Extension Guide ..... P. Boman
  - f. WG Revision of C57.143, Monitoring Guide ..... M. Spurlock
  - g. WG Revision of C57.148, Control Cabinet Standard ..... J. Watson
  - h. WG Revision of C57.150, Transportation Guide..... G. Anderson
  - i. TF Transformer V/Hz Curves ..... J. Watson
  - j. TF Transformer Condition Assessment Guide ..... B. Sparling
7. New business
8. Old business
9. Adjournment

**Attachment K.4.2**

Working Group to Installation of Power Transformers C57.93  
Monday, October 30, 2017  
1:45 – 3:15 PM  
Marriott 5  
Louisville, KY

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 33 of 44 members present. There were 38 guests and 30 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 Spring 2017 minutes
5. Items of Discussion
  - Draft 1.4 – any outstanding issues?
  - Member's vote on putting forward a motion at the Power Transformer Subcommittee to request conducting a ballot on Draft 1.4 among the Subcommittee members
6. Unfinished Business
7. New Business
8. Adjournment

Due to the time constraints, attendees did not introduce themselves.

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

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

**Chair's Remarks:**

Chairman Lau reviewed the results of the straw ballot of draft version 1.4. There were 35 responses, 20 approved, 11 approved with comments, 0 disapproved, 3 disapproved with comments and I abstained. 175 comments submitted that require ballot resolution. The comments were mostly editorial but some were technical related to Natural Esters and Safety.

As a result of feedback from the Spring 2017 meeting, where it was feasible, duplication in sections 4 and 5 of the guide were merged.

Wally Binder referenced the Normatives to ensure everything is editorial correct. Sue McNelly mentioned to review the scope to ensure there is no conflict.

Derek Baronowski made a motion to seek approval from the Power Transformer Committee to go to ballot with version 1.4 and it was seconded by Joe Watson. Motion carried unanimously. The Working Group will meet in Spring 2018.

Under new business, David Murray requested opinions on whether to perform a complete electrical test for relocating a GSU transformer a couple of hundred yards or just perform an SFRA test. Comments were overwhelming in favor of complete electrical testing.

Vijayan Krishnamurthy requested to review extending the storage time beyond 6 months without oil.

The meeting was adjourned at 2:26 pm.

Unapproved Draft

<b>Meeting Minutes</b>
<b>P60214-2</b>
<b>Tap-Changers - Part 2: Application guide</b>

**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:** 31 October 2017                      **Time:** 13:45 to 15:00

**Location:** Louisville, KY

<b>1. Attendance:</b>	<b>2. Members</b>	<u>17</u>
	<b>3. Guests</b>	<u>33</u>
	<b>4. Guests Requesting Membership</b>	<u>7</u>
	<b>Total</b>	<u>57</u>

### **Meeting Minutes / Significant Issues / Comments:**

1. Meeting was called to order at 1:45 pm, October 31, 2017.
2. Introductions were made and attendance sheets were passed out.
3. Call for patents were made with no response from any attendees.
4. Agenda for this meeting was unanimously approved.
5. Minutes from April 2017 in New Orleans were unanimously approved after time change.
6. More than 50% WG members were in attendance so a quorum was established.
7. Craig Colopy took the opportunity to provide an update on the status of the adoption of 60214-Part 1, published in 2014, for the purpose of replacing C57.131-2012. PAR was accepted to with a WG initiated. An obstacle was formed when IEC did not allow IEEE to obtain a copy for the adoption process. An agreement was reached at the IEC TC14 meeting in Boston to have NEMA Transformer Technical Committee look into and accept working with IEC in obtaining a copy of the IEC standard for the WG. A proposal has been sent to Gerard Winstanley, NEMA Program Manager.
8. Vice-Chair Axel Kraemer presented results from IEC CD circulation and IEEE ballot.
  - a. IEC CD was circulated as document 14/913/CD on June 9th, 2017
    - i. 99 comments on CD was published as 14/926A/CC on September 15th, 2017
    - ii. Vice-Chair mentioned 2 technical comments from IEC CD circulation to the group which will be discussed in more detail at the Nov 2-3, 2017 work session.
    - iii. Comments will cause only minor changes in the CD, no 2nd CD necessary
    - iv. Next step: revised draft will be distributed as a CDV
  - b. IEEE ballot – August 18 – September 17, 2017
    - i. ballot group membership was 106
    - ii. Votes: 75 affirmative / 3 negative / 6 abstention
    - iii. 156 comments (117 editorial / 27 technical / 11 general)
    - iv. Vice-Chair reviewed IEEE general and technical comments and will review in more detail during Nov 2-3, 2017 work session in Louisville, KY.
    - v. Comments will cause only minor changes in the CD

- vi. Next step: revised draft will be recirculated in parallel with IEC CDV
- 9. Next work session is November 2-3, 2017 in Louisville, KY.
- 10. Meeting adjourned at 3:00 pm.

Submitted by: Craig A. Colopy      Date: 11/01/17



**Revision to C57.143 – “Guide for Application of Monitoring Equipment to  
Liquid-Immersed Transformers and Components”  
Transformer Monitoring Working Group**

**Monday, October 30, 2017**

**Louisville, KY, USA**

**Minutes of WG Meeting**

The meeting was called to order at 3:16pm by Vice Chair Brian Sparling. Secretary Mark Cheatham was also present.

This was the second meeting of the working group, rosters were circulated and members asked to stand to determine quorum, quorum was reached with 38 of 68 members present. The attendance for the meeting was as follows:

Number of Members in Activity = 68

Number of Members Present = 38

Quorum Present = 55.9%

Number of attendees = 130

Attendees requesting Membership = 11

The WG does plan to meet at the spring 2018 Transformers Committee Meeting in Pittsburgh.

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.

**K.9 MEETING AGENDA**

1. Welcome & Introduction
2. Call for Patent Disclosure
3. Roster Circulation
4. *Quorum Roll Call*
5. Chair Remarks
6. New Members – Indicate on Roster
7. Working Group Activities
  - a. Discuss scope of C57.143 PAR, identify suggestions that may be outside of scope, and determine course of action.
  - b. Presentation to go over suggestions/comments from the Review Team submitted last month. Including suggested, additional content, modification of existing Chapters, and Annex sections

## 8. New Business

If you have any new business items to present at the meeting, please inform the Chairman, and Vice Chairman, as well as the Secretary, with your suggestion, for review, to make sure it fits within the scope and time of this meeting. Already identified include;

1. Adding to the introduction statements related to WHY, a transformer owner wants to monitor their transformer
2. Addition of a new Chapter on Data Analytics
3. Improvement to Chapter dealing with communications
4. Concepts on change management, and how the outputs of the system can deliver the value sought.
5. Moving ANNEX 'E' into a new Chapter.
6. Moving ANNEX 'D' into a new Chapter
7. Set up task forces as needed to begin editing different sections of the guide.

Brian Sparling asked for any patent claims against C57.143 to be raised by attendees, none were expressed.

Brian Sparling reviewed the scope of the PAR with the WG and posed the question to the group of whether the scope should be revised to consider covering interpretation of monitoring results. There was much discussion on this by the group, with support for revision and opposition ultimately leading to a motion by Roger Verdolin to remove the word “Not” from the last line of the scope as follows; “This guide does **not** cover interpretation of monitoring results.” The motion was seconded by Joe Watson, a vote by the working group did not meet the required support to carry the motion and thus no change to the scope.

Brian Sparling reviewed the purpose of the PAR with the WG. Luiz Chiem made a motion to add the word supply to the purpose as follows:

“The purpose of this document is to provide guidance to those who **supply**, specify, apply, install, and use on-line monitoring equipment on liquid-immersed power transformers and their components”

The motion was seconded by Emilio Morales, a vote by the working group members present did not meet the required support to carry the motion and thus no change to the purpose.

Brian Sparling Presented suggestions/comments from the Review Team submitted last month. Including suggested, additional content, modification of existing Chapters, and Annex sections with the working group. The presentation also covered the content comparison between C57.143-2012 and Cigre TB 630. A copy of this presentation will be shared with the working group.

Brian Sparling informed the WG that members will be contacted prior to the Pittsburgh meeting based on their communicated interest and expertise to form TF to focus on specific sections of the guide for revision.

A motion to Adjourn was given by Luiz Cheim and seconded by Roger Verdolin

**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 10/30/2017 in Marriott Rooms 7-9 at the Louisville Downtown Marriott Hotel in Louisville, Kentucky. 39 attendees were recorded, including 19 members. No quorum was reached. It was the third official Working Group meeting for this project. The complete attendance record is available in the AMS System. 2 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. As no quorum was reached, no official business was conducted. As a result, the New Orleans Spring 2017 meeting minutes and the Fall 2017 meeting agenda were discussed but not approved.

The WG chairman asked Ryan Musgrove, leader of TF for Review of Section 5, to discuss the task force comments.

Comment #14 was about cabinet to tank wall distance requirements. The TF couldn't find explanation supporting the 60mm that was proposed by the commenter, but agreed that the 200mm distance between the cabinet and tank wall should be discussed and possibly reduced.

Comment #16, in reference to explosion-proof requirements of the control cabinet, was discussed in detail. Markus Stank of Reinhausen suggested that the standard should exclude these special requirements. The majority of attendees agreed that the WG should not take on the requirements for specialty transformers. Gary Hoffman of Advanced Power Technologies volunteered to draft an informative note. He will report back to the TF leader.

In response to Comment #19 regarding the box material, TF members wanted to highlight the importance of avoiding the use of plastic.

Regarding Comment #27 about the use of fire-resistant instead of fire-retardant for finger proof cover, Hakim Dulac from Qualitrol believed that the requirement should be "Fire retardant" unless otherwise stated as fire-resistant is not easily achievable. He volunteered to revise this paragraph and will report back to the chair with a proposal or clarification.

Control door alarm was then discussed. One of the key considerations was various compliance requirements. The WG Chairman suggested that a door alarm should be added in the standard, perhaps as an optional feature. Weijun Li didn't agree since padlock is already standard on each cabinet and there usually are plenty of surveillance/security monitoring points at substations; therefore adding a control cabinet door alarm seem redundant or unnecessary.

Regarding Comment #40 about replaceable gasket, Markus Stank of Reinhausen asked if all gasket can be replaceable. JF Collin from Nomos Systems confirmed that usually, all gasket foamed doors are replaceable. Gary Hoffman from Advanced power technologie said that if the end users understand they might have to scratch the gasket, then "replaceable" should stay in

the standard. The group agreed that there is no need to remove “replaceable” from the standard.

In response to Comment #43, the group proposed to replace “stainless steel” by “same material”.

Regarding empty space provision, Comment #46, Ryan Musgrove of Oklahoma Gas & Electric and Weijun Li proposed having 20% provision for future needs. Markus Stanks suggested letting it as a user-defined option instead of a standard requirement.

Review of all comments on section 5 will continue at the next meeting. WG chair will post the spreadsheet received from TF on the WG web site.

Following TF section 5 work, Shankar Nambi of Bechtel, TF leader of section 6 & 7, will present TF comments during the next meeting.

The WG officers will review and wrap-up additional comments prior to next meeting.

The group will meet again in Pittsburgh, Pennsylvania in March 2018. The meeting was adjourned at 12:15 PM.

**C57.150 – IEEE Guide for the Transportation of Transformers and Reactors  
Rated 10 000 kVA or Higher**

Tuesday, October 31, 2017

Louisville, KY, USA

Minutes of WG Meeting

**The meeting was called to order at 11:00am by Chair Greg Anderson. Vice-Chair Ewald Schweiger and Secretary Susan McNelly (writer of Minutes) were also present.**

**There were a total of 93 people present, 22 members and 71 guests. The WG plans to meet at the Spring 2018 Transformers Committee Meeting in Pittsburgh, Pennsylvania. No roster was passed around for the meeting, so any guests desiring membership will need to contact one of the WG officers.**

*Agenda*

1. Welcome
2. Patent Issues
3. WG Leaders
4. Brief History of WG
5. Timeline
6. Presentation by Andy Burns, Edwards Moving & Rigging
7. Comparison to CIGRE Guide

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.

Rogério Verdolin motioned to approve the agenda and it was seconded by Craig Steigemeier. There were no objections to the agenda as identified above.

The minutes of the Spring Meeting were never distributed. They will be distributed with minutes for this meeting for review and approval at the spring meeting in Pittsburgh.

List of Meeting Attendees is provided below. Those identified with an asterisk are WG Members in attendance.

Hamid	John Lackey	Andrew
Abdelkamel*	Michael Lau*	Steineman*
Gregory	Antoine Lecomte	Gregory Stem*
Anderson*	Qian Li	Craig Stiegemeier*
Javier Arteaga*	Mario Locarno*	Roy Su*
Young Wook Bae	Rogelio Martinez	Kevin Sullivan*
Gilles Bargone	Douglas	Yunhan Sun
Cheryl Basel*	McCullough	Craig
Claude	James Mciver	Swinderman*
Beauchemin	Susan McNelly*	Troy Tanaka
Enrique	Justin Minikel	Robert Thompson*
Betancourt*	David Murray	Olivier Uhlmann*
William Boettger*	Shankar Nambi	Alwyn
Andrew Burns	Joe Nims*	VanderWalt*
Jim Cai	Kraig Nunn	Rogério Verdolin*
Juan Castellanos*	William Oliver	Krishnamurthy
Vincent Chiodo	Vijay Pargaonkar	Vijayan
Eun Cho*	George Partyka	Sukhdev Walia*
Larry	Verena Pellon	David Wallach*
Christodoulou	Brian Penny*	Joe Watson*
Nikita Dave	Ion Radu*	Bruce Webb
Eric Davis	Jimmy Rasco	Daniel Weyer*
Rodolfo Diaz	Rakesh Rathi*	Shuzhen Xu
James Fairris*	Jeffrey Ray	Hsiao-Yu Yeh
Howard Fennell*	Kevin Riordan	Kris Zibert*
Ryan Fields*	Marnie Roussell	
Shawn Galbraith*	Alfons	
Eduardo Garcia*	Schrammel*	
James Gardner*	Wesley Schrom	
Alexander Gaun*	Ewald Schweiger*	
Thomas Golner*	Cihangir Sen*	
Bill Griesacker*	Mark Shem-Tov	
Bridget Havens	Yukiyasu	
Jeffery Henry	Shirasaka*	
Carl Hummel	Richard	
Grace Jones	Simonelli*	
Makoto Kadowaki	Andre Simons*	
Gael Kennedy*	Yong Tae Sohn*	
Stacey Kessler*	Thomas Spitzer*	
Peter Kleine	Brad Staley	
Nicholas Kostich*		

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 expiration of the PAR.

### **Presentation by Andy Burns, Edwards Moving & Rigging**

Andy provided an updated presentation of one presented at the Thursday morning tutorial on Transportation of Transformers, The Hot Buttons in April of 2015.

Dave Wallach commented that some of the states are requiring the entity requesting a permit to do an engineering analysis on bridges that will be crosses. Andy indicated that there are several states taking this approach.

Kris Zibert asked whether it is difficult to provide cost estimates early on for moving of units. Andy indicated that permits are typically not requested for a proposal, so estimates are based on previous moves.

Question was asked as to whether various route plans looked at when putting together proposals? Andy indicated that yes more than one route is reviewed.

Craig Stiegemeier asked if anyone has gone to the authorities with proposals for how to respond to emergency situations with permits. He indicated that he is worried that it would take another Metcalf type event for something to move forward in this direction. Andy indicated that there is a bureaucracy problem and that plans to streamline the process need to be put into place.

Greg indicated that there is a CIGRE Guide, WG A2 42 (CIGRE Proceedings 673), on Transformer Transportation. He would like to have volunteers to review that guide and compare to the existing C57.150.

Mario Locarno, Bruce Webb, Vijayan Krishnamurthy, and Ewald Schweiger volunteered to review the Guide. Mario indicated that the CIGRE Guide is very complete and covers a number of important issues. Shankar Nambi and Hamid Abdekkamel volunteered to help with comparison of the CIGRE and C57.150 documents, but do not have access to the CIGRE. Whether this can be provided or not will be looked at.

Greg reviewed items that had been identified at the last meeting and asked if there were any additional items.

Dave Wallach mentioned the idea of a “swimlanes” 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 shown below:



PC57.150 Swim Lane Concept for Introductory Information				David Wallach		
	Conceptual	Pre-bid	Quotation	Manufacturing	Shipment	Receipt
Customer	Location Assessment Clause X.X	Develop Location Description Clause X.X	Review completeness of information Clause X.X	Finalize Shipping Details Clause X.X	Monitor Shipping Status Clause X.X	Arrange for Receipt Inspection Clause X.X
Manufacturer			Engage Freight Forwarders & Initial Logistics Clause X.X	Finalize Shipping Details & Size and Weight Confirmation Clause X.X	Ex-Factory Details & Monitoring Shipping Status Clause X.X	Support of Receipt Clause X.X
Freight Forwarder			Support Manufacturer Clause X.X		Handling and Notifications Clause X.X	Customer Interface Clause X.X
Rigger			Support Manufacturer Clause X.X		Lift Plans Clause X.X	Transformer Movement Clause X.X
Inspector				Ex-factory Inspection Clause X.X	Inspections During Transportation Clause X.X	Receipt Inspection Clause X.X
Assembly						Refer to IEEE C57.93
Field Test						Refer to IEEE C57.93

Joe Watson indicated that a lot of the impact recorder reports include a frequency and duration that may need to be covered. Rakesh Rathi , Craig Nunn and Shankar Nambi volunteered to review and provide updates to the impact recorder section of the Guide.

Rich Simonelli volunteer for shipping with Ester liquids.

Dave Wallach and Cihangir (John) Sen volunteered to review redundancy and emergency planning issues.

Greg asked whether something needs to be included about how to deal with impact limits being exceeded. Joe Watson also indicated there is nothing regarding internal bracing for shipment. Greg indicated we try to shy away from design issues, but there may be a way to provide some guidance. Rogerio Verdolin indicated that he has had issues with exceeded limits and struggled with how to deal with this. He indicated that there should be a reference in the document on this. He and Joe Watson will look at what items could be included in this regard.

Wally Binder indication that C57.152 is just starting up. He recommended that test limits be referred to C57.152 and at present doesn't see any tests that need to be added to the Transportation Guide.

Joe Watson indicated that if there are requirements that you should check air pressure, for instance, we should indicate that a pressure gauge should be required. Joe and Wally will review the test portion and identify any items that should be included.

Javier Arteaga will look at the topic of pressure changes during transportation that was raised at the last meeting.

Juan Castellanos indicated that he has had experience with custom officers breaking vacuum and damaging parts when doing inspections at the port or border.

Greg Anderson, Kevin Sullivan, and Roy Su volunteer to review the SFRA test section.

Dave Wallach mentioned that there should be a table or graphic showing responsibilities with regards to transportation.

John Sen asked if the Installation Guide (C57.93) should be reviewed to determine if there is any overlap. Greg indicated that this was done during development of the first transportation guide, but would be worth reviewing again to see if there are any updates to C57.93 that conflict.

A draft of the present Guide will be posted with a special password for the volunteers to access.

The meeting was adjourned at 12:15PM

Greg Anderson  
WG Chair

Ewald Schweiger  
WG Vice-Chair

Susan McNelly  
WG Secretary

**C57.150 – IEEE Guide for the Transportation of Transformers and Reactors Rated 10,000kVA or Larger**

Tuesday, April 4, 2017

New Orleans, Louisiana, USA

Minutes of WG Meeting

**The meeting was called to order at 11AM by Chair Greg Anderson. Vice-Chair Ewald Schweiger and Secretary Susan McNelly (writer of Minutes) were also present.**

**Since this is the first meeting of the WG, anyone requesting membership on the initial roster will be accepted as a WG Member. Retention of this membership will be determined based on participation and attendance at future meetings. There were 28 of the total 113 attendees that requested membership. There were a total of 110 people that signed in on the paper roster with 5 of those on the paper roster not on the RFID tabulation and 3 on the RFID list that were not on the paper roster.**

**The WG plans to meet at the Fall 2017 Transformers Committee Meeting in Louisville, Kentucky.**

**The following guests requesting membership were:**

<b>Abdelkamel, Hamid</b>	<b>Weldetnsae, Yotam</b>
<b>Arteaga, Javier</b>	<b>Zibert, Kris</b>
<b>Binder, Wallace</b>	<b>Garcia, Eduardo</b>
<b>Boettger, William</b>	<b>Gyore, Attila</b>
<b>Fairris, James</b>	<b>Kampshoff, Ken</b>
<b>Garcia, Eduardo</b>	<b>Kessler, Stacey</b>
<b>Gyore, Attila</b>	<b>Lau, Michael</b>
<b>Kampshoff, Ken</b>	<b>Lee, So-young</b>
<b>Kessler, Stacey</b>	<b>Locarno, Mario</b>
<b>Lau, Michael</b>	<b>McShane, Charles Patrick</b>
<b>Lee, So-young</b>	<b>Mukerji, Amitav</b>
<b>Locarno, Mario</b>	<b>Sbravati, Alan</b>
<b>McShane, Charles Patrick</b>	<b>Schrammel, Alfons</b>
<b>Mukerji, Amitav</b>	<b>Simons, Andre</b>
<b>Sbravati, Alan</b>	<b>Su, Roy</b>

<b>Schrammel, Alfons</b>	<b>Sullivan, Kevin</b>
<b>Simons, Andre</b>	<b>Swinderman, Craig</b>
<b>Su, Roy</b>	<b>Uhlmann, Olivier</b>
<b>Sullivan, Kevin</b>	<b>VanderWalt, Alwyn</b>
<b>Swinderman, Craig</b>	<b>Verdolin, Rogerio</b>
<b>Uhlmann, Olivier</b>	<b>Wallach, David</b>
<b>VanderWalt, Alwyn</b>	<b>Watson, Joe</b>
<b>Verdolin, Rogerio</b>	<b>Weisensee, Matthew</b>
<b>Wallach, David</b>	<b>Weldetnsae, Yotam</b>
<b>Watson, Joe</b>	<b>Zibert, Kris</b>
<b>Weisensee, Matthew</b>	

**All of the above will be added as WG members.**

*Agenda*

1. Attendance Roster Circulation
2. Agenda Review
3. Patent Call
4. Introduction of WG Leaders
5. Revision Topics and Assignments
6. New Business
7. Adjournment

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.

List of Meeting Attendees is provided below. Those identified in bold are WG Members in attendance.

Abdelkamel, Hamid	Holmes, Jill	Sauzay, Mathieu
Alongia, Rachel	Horning, Michael	Sbravati, Alan
Amos, Richard	Kaineder, Kurt	Schrammel, Alfons
Anderson, Gregory	Kaiserseder, Gerald	Schweiger, Ewald
Arteaga, Javier	Kampshoff, Ken	Selvaraj, Pugazhenth
Ayers, Roy	Kanty, Steve	Sen, Cihangir
Badaracco, Ken	Kennedy, Gael	Sethi, Kabir
Basel, Cheryl	Kessler, Stacey	Sharpless, Sam
Baumgartner, Christopher	Kim, Dong-Soo	Shirasaka, Yukiyasu
Betancourt, Enrique	Kim, Young	Simonelli, Richard
Binder, Wallace	Kostich, Nicholas	Simons, Andre

Blake, Dennis	Lau, Michael	Skinger, Kenneth
Boettger, William	Lee, Shawn	Sohn, Yong Tae
Bolar, Sanket	Lee, So-young	Speegle, Andy
Bradford, Ira	Liu, Chien Chih	Spitzer, Thomas
Bradshaw, Jeremiah	Locarno, Mario	Spurlock, Mike
Cantu de Leon, Jorge	Lugge, Andrew	Steineman, Andrew
Castellanos, Juan	Maia, Mario	Stem, Gregory
Castillo, Alonso	Mango, Joseph	Stiegemeier, Craig
Cho, Eun	Marshall, Scott	Su, Roy
Chu, Wen-Ping	McNelly, Susan	Sullivan, Kevin
Duart, Jean-Claude	McShane, Charles Patrick	Swinderman, Craig
Epperson, Hazel	Mehta, Shirish	Thompson, Clifton
Fairris, James	Minhaz, Rashed	Thompson, Robert
Fennell, Howard	Mukerji, Amitav	Tuli, Subhash
Fields, Ryan	Munro, Andrew	Uhlmann, Olivier
Ford, Gary	Musgrove, Ryan	van der Kolk, Stefan
Galbraith, Shawn	Mushill, Paul	VanderWalt, Alwyn
Galhardo, Leonardo	Natale, Anthony	Verdolin, Rogerio
Garcia, Eduardo	Neal, Jason	Walia, Sukhdev
Gardner, James	Nickoley, Ingo	Wallach, David
Gaun, Alexander	Nims, Joe	Watson, Joe
Golner, Thomas	O'Malley, Anastasia	Weisensee, Matthew
Gragert, Jeffrey	Penny, Brian	Weldetnsae, Yotam
Griesacker, Bill	Radu, Ion	Weyer, Daniel
Gyore, Attila	Ramirez Bettoni, Eduardo	Wu, Shawn
Hartmann, Thomas	Rathi, Rakesh	Zibert, Kris
Holleran, Joseph	Razuvayev, Sergiy	

A call for disclosure of any essential patent or patent applications claims was made. There were no patent claims identified.

## **History**

Greg gave a brief history of the Guide. It was started approximately 13 or 14 years ago. There was only an installation guide available at the time. C57.150 covers a unit up until it is delivered and offloaded. C57.93 covers everything after that point for installation and testing.

A question was asked by Wally Binder about where C57.150 starts. Does it start at the point it is permitted and loaded at the manufacturer? A comment was made by Ewald that it starts at the specification.

## **Timeline**

The guide was completed in 2012 and published in 2013. A new revision is due by the end of 2022.

A PAR for revision of C57.150 was requested in February of 2017 and has been approved. The PAR expiration date is 12/31/2022

The project need identified on the PAR was read to the group.

### **Revision Topics/Assignments**

Greg requested attendees come up and identify any area that are in need of revision.

Joe Watson commented that it would be good to get feedback from those that have used the document since it was published.

### **Suggested Additions/Revisions**

Greg Anderson – Mobile transformers

Wally Binder – When does the transportation effort start?

Anderson/McNelly – Lashing requirements or recommendations for information from supplier

McNelly – Impact recorders – special options for overseas shipment?

Mario Locarno – Indicated that there is a CIGRE document A2.42 #637 that has considerable content on transportation. Greg asked for a volunteer to review the CIGRE document to see if there is content that should be covered in C57.150.

Greg Anderson – Impact recorders have X, Y, Z, but there are other factors such as tilt and roll, frequency, duration

Alan Sbravati – In C56.93, he indicated that there are special needs for shipment of natural ester filled units.

Dave Wallach – Indicated that there are probably changes to issues related to transportation path maintenance, planning ahead for routing of transformers for emergencies, advance planning

Rogério Verdolin – Mentioned an issue of what to do when impact limits are exceeded. What type of testing should be done. Greg indicated that some of this should be covered up front in a contract.

Sukhdev Walia - Special concerns with construction of roads to sites in the mountain or on steep slope. Need to design the road for turning radius and slope.

Bob Thompson – indicated the pitch and roll may not be applicable only on shipment from overseas. It could also be seen for over the road shipment.

Wally Binder – Mentioned the field testing guide would identify the limits of test and suggests tests to be performed before receipt. Provide reference to C57.152. Greg asked Wally if he could review that document to see if there is anything that should be incorporated into our document.

Joe Watson – Mentioned that if there are tests that other documents recommend, that there should be mentioned in C57.150 to make provisions for any special testing.

Sam Sharpless – Indicated he agreed with Rogério Verdolin. There needs to be information sharing between the user and the supplier regarding impacts or other unusual circumstances that may have occurred during transport. Greg mentioned the inco-terms that are in the document that identifies the responsibility of transportation.

Javier Arteaga – The temperature of the gas inside the transformer is not the same as various times during the transport. There needs to be something covering this. Javier was asked to prepare a paragraph or two that would cover this.

Juan Castellanos – Indicated shared experiences or examples for inspections at the port of entrance. There have been items damaged due to customs inspections.

Rakesh Rathi – location of impact recorder, types of recorders, issues with batteries, solar type

that get covered by a tarp, etc. are topics that should be covered. Susan McNelly indicated that we could also maybe provide more detail regarding the placement of the impact recorders.

Scott Marshall – Performing SFRA in the shipping configuration. There are problems matching up results. Greg indicated that this is covered, but there may be enhancements that could be made.

Greg indicated we are looking for experts in the various areas to look at the document and provide input or suggestions for improvement or items that are missing.

The meeting was adjourned at 12:00PM

Greg Anderson  
WG Chair

Ewald Schweiger  
WG Vice-Chair

Susan McNelly  
WG Secretary

## 2017 Fall Meeting

Location: Louisville Kentucky  
Meeting Room: "Marriot 6", 2nd Floor  
Date: Tuesday, Oct 30<sup>th</sup> 2017  
Time: 9:30 hours – 10:45 hours

### MINUTES of Task Force on Need for Guide for Condition Assessment of Transformers

The TF group met with 122 people in attendance. 67 requested Membership.

- A. Welcome & Introduction
- B. Roster Circulation
- C. Previous meeting minutes was approved.
- D. Present meeting agenda was proposed and approved.
- E. Chair Remarks:
  - 1. Consider as a group adopting acceptable criterion from existing IEEE Guides published or those published by the US Bureau of Reclamation (FIST Volume 3-31), and/or Cigré to assist them in determine the condition of their units.
  - 2. The chair showed some examples of condition assessment scale based on IEEE criteria for bushings.
  - 3. Brian mentioned that the title and scope needs to be approved by the TF before a PAR could be submitted.
  - 4. The chair proposed a list of topics that could be considered for inclusion in the scope portion.
- F. Bruce Forsyth mentioned that the TC has already approved the creation of a WG for developing this guide.
- G. The proposed PAR title " A Guide for the Assessment of Liquid Immersed Transformers, Reactors and their components " was tabled for discussion.
  - 1. There was a lot of discussion about the title and what components needed to be included.
  - 2. Tom Prevost suggested that we remove the words "and their components" and adopt the remaining words in the title.
  - 3. Joe W moved the motion to adopt. Tom P seconded it.
  - 4. The proposed title "A Guide for the Assessment of Liquid Immersed Transformers, Reactors was approved."
- H. The scope " A Guide for the Assessment of Liquid Immersed Transformers, Reactors and their components, to determine and quantify the overall condition by means of an Index" was tabled for discussion.
  - 1. Joe Watson felt that the word "index" in the title restricted the scope of the proposed guide.
  - 2. The chair proposed a list of topics that could be considered for inclusion in the guide.
  - 3. There was a lot of discussion on what needed to be included in the scope.
  - 4. Due to shortage of time, the scope draft could not be adopted.
  - 5. There was a suggestion that we create a sub TF to draft the scope before the Spring 2018 and get it balloted by the Power Transformers SC.
- I. The chair requested for volunteers. 22 volunteers have offered their help.
- J. The plan is to complete the scope verbiage by having a few conference calls between now and the Spring 2018 meeting and submit the PAR at the end of that meeting..
- K. Meeting was adjoined.



L. The next meeting of this TF will be held in Pittsburgh, PA.

Brian Sparling, Chair

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