**Chairman: George Payerle**

**Vice-Chair: Tony Reiss**

**Meeting Date: 4/28/2021 Location: Virtual Time: 10:50 – 12:05 CT**

**Meeting Administration:**

**Meeting opened at 10:52 CT**

* Chairman’s Comments

The chair talked about Main Committee membership. Membership in IEEE and SA and PES are all required plus filling out an application listing subcommittee and working group participation and getting references. Forms are under Information on the Transformers Committee website.

Quorum determination – The meeting had 54 participants. There are 36 current members of whom 24 were present so quorum was achieved. . Five guests requested membership.

The agenda was approved and the minutes of F20 were approved without objection.

**SC Members present**

|  |  |  |
| --- | --- | --- |
| Israel | Barrientos | Prolec GE |
| Douglas | Craig | Richards Manufacturing Co. |
| Thomas | Dauzat | General Electric |
| Mark | Faulkner | EATON Corporation |
| Benjamin | Garcia | Southern California Edison |
| Carlos | Gaytan | Prolec GE |
| Said | Hachichi | Hydro-Quebec |
| Kenneth | Hampton | Baltimore Gas & Electric |
| Gary | Hoffman | Advanced Power Technologies |
| Brad | Kittrell | Consolidated Edison Co. of NY |
| Brian | Klaponski | Carte International Inc. |
| Alejandro | Macias | CenterPoint Energy |
| Daniel | Mulkey | Mulkey Engineering Inc. |
| George | Payerle | Carte International Inc. |
| James | Ratty | Electronic Technology Inc. |
| Clemens | Reiss IV | Custom Materials, Inc. |
| Pedro | Salgado | Electronic Technology Inc. |
| Dan | Schwartz | Quality Switch, Inc. |
| Jeremy | Sewell | Quality Switch, Inc. |
| Adam | Sewell | Quality Switch, Inc. |
| Igor | Simonov | Toronto Hydro |
| Michael | Thibault | Pacific Gas & Electric |
| Alan | Traut | Howard Industries |
| John | Vartanian | National Grid |
| Joshua | Verdell | ERMCO |

**SC Guests Present**

|  |  |  |
| --- | --- | --- |
| Nabi | Almeida | Prolec GE USA LLC |
| Gregory | Ante | Southern California Edison |
| Jared | Bates | Oncor Electric Delivery |
| Kevin | Biggie | Weidmann Electrical Technology |
| Douglas | Craig | Richards Manufacturing Co. |
| William | Elliott | General Electric |
| Benjamin | Garcia | Southern California Edison |
| Rob | Ghosh | General Electric |
| Zoran | Goncin | PTI Transformers |
| Kendrick | Hamilton | Power Partners, Inc. |
| Kendrick | Hamilton | Power Partners, Inc. |
| Ramadan | Issack | American Electric Power |
| Robert | Kinner | FirstPower Group LLC |
| Andrew | Larison | Hitachi ABB Power Grids |
| Christopher | Lianides | Southern California Edison |
| Jinesh | Malde | M&I Materials Inc. |
| Chris | Pitts | Howard Industries |
| Kevin | Rapp | Cargill, Inc. |
| Albert | Sanchez | Knoxville Utilities Board |
| Jaber | Shalabi | VanTran Industries, Inc. |
| Hamid | Sharifnia | Consultant |
| Avijit | Shingari | Pepco Holdings Inc. |
| Adam | Smith | Commonwealth Associates, Inc. |
| Radoslaw | Szewczyk | Specialty Products Poland |
| Timothy | Tillery | Howard Industries |
| Parag | Upadhyay | ABB Inc. |
| Duy | Vo | Central Maine Power (AVANGRID) |
| Shelby | Walters | Howard Industries |
| Leon | White | H2scan |
| Michael | Zarnowski | Carte International |

**Working Groups Report:**

* **C57.12.23 Single-Phase Submersible Transformers** working group –
* **NOT MEETING AT THIS TIME**  
  Alan Traut, Chairman,
  + Revision due date: 12/31/2028
  + PAR Approval Date: 12/5/2018
  + PAR Expiration Date:

Stage: On break

* **C57.12.24 Three-Phase Submersible Transformers** working group –   
  Ben Garcia, Chairman; Tom Dauzat, Vice Chair; George Payerle, Secretary
  + Approved: **12/7/2016**
  + Revision Due Date: 12/31**/**2026
  + PAR Approval Date:
  + PAR Expiration Date: **12/31/23**

Stage: Recently Approved

IEEE/PES Transformers Committee Working Group on Requirements

For Three-Phase Submersible Transformers (C57.12.24)

**Virtual** **Meeting Minutes**

Tuesday, April 27, 2021

Members Present

|  |  |  |
| --- | --- | --- |
| Glenn | Andersen | Fayetteville PWC |
| Piotr | Blaszczyk | Specialty Transformer |
| John | Chisholm | IFD Corporation |
| Rhett | Chrysler | ERMCO |
| Douglas | Craig | Richards Manufacturing Co. |
| Michael | Dahlke | Central Moloney, Inc. |
| Thomas | Dauzat | General Electric |
| Larry | Dix | Quality Switch, Inc. |
| William | Elliott | General Electric |
| Benjamin | Garcia | Southern California Edison |
| Carlos | Gaytan | Prolec GE |
| Said | Hachichi | Hydro-Quebec |
| Kenneth | Hampton | Baltimore Gas & Electric |
| Michael | Hardin | H-J Enterprises, Inc. |
| John | Harley | FirstPower Group LLC |
| Ramadan | Issack | American Electric Power |
| Robert | Kinner | FirstPower Group LLC |
| Brad | Kittrell | Consolidated Edison Co. of NY |
| Brian | Klaponski | Carte International Inc. |
| Andrew | Larison | Hitachi ABB Power Grids |
| Alejandro | Macias | CenterPoint Energy |
| Kent | Miller | T&R Electric Supply Co. |
| Michael | Morgan | Duke Energy |
| Daniel | Mulkey | Mulkey Engineering Inc. |
| George | Payerle | Carte International Inc. |
| Jarrod | Prince | ERMCO |
| Juan | Ramirez | CELECO |
| James | Ratty | Electronic Technology Inc. |
| Pedro | Salgado | Electronic Technology Inc. |
| Avijit | Shingari | Pepco Holdings Inc. |
| Audrey | Siebert-Timmer | IFD Corporation |
| Igor | Simonov | Toronto Hydro |
| James | Spaulding | Fort Collins Utilities |
| Christopher | Sullivan | Westmark Partners |
| Michael | Thibault | Pacific Gas & Electric |
| Alan | Traut | Howard Industries |
| Jeremy | Van Horn | IFD Corporation |
| John | Vartanian | National Grid |

Guests Present

|  |  |  |
| --- | --- | --- |
| Scott | Abbott | PPG |
| Nabi | Almeida | Prolec GE USA LLC |
| Angela | Amador | EATON Corporation |
| Gregory | Ante | Southern California Edison |
| Kevin | Biggie | Weidmann Electrical Technology |
| Jeffrey | Door | H-J Family of Companies |
| Ali | Ghafourian | H-J Enterprises, Inc. |
| Zoran | Goncin | PTI Transformers |
| Jeffrey | Gragert | Xcel Energy |
| Kendrick | Hamilton | Power Partners, Inc. |
| Didier | Hamoir | Transformer Protector Corp |
| Gary | King | Howard Industries |
| Olivier | Lejay | Huaming USA Corp. |
| Christopher | Lianides | Southern California Edison |
| Gerald | Paiva | Consultant |
| Vinay | Patel | Consolidated Edison Co. of NY |
| Chris | Pitts | Howard Industries |
| Clemens | Reiss IV | Custom Materials, Inc. |
| Albert | Sanchez | Knoxville Utilities Board |
| Manish | Saraf | Hammond Power Solutions |
| Dan | Schwartz | Quality Switch, Inc. |
| Jeremy | Sewell | Quality Switch, Inc. |
| Adam | Sewell | Quality Switch, Inc. |
| Jaber | Shalabi | VanTran Industries, Inc. |
| Stephen | Shull | BBC Electrical Services, Inc. |
| Edward | Smith | H-J Family of Companies |
| Radoslaw | Szewczyk | Specialty Products Poland Sp. z o.o. |
| Joseph | Tedesco | Hitachi ABB Power Grids |
| Giuseppe | Termini | PECO Energy Company |
| Timothy | Tillery | Howard Industries |
| Joshua | Verdell | ERMCO |
| Duy | Vo | Central Maine Power (AVANGRID) |
| Shelby | Walters | Howard Industries |
| Bruce | Webb | Knoxville Utilities Board |
| Helena | Wilhelm | Vegoor Tecnologia Aplicada |
| Alan | Wilks | Consultant |
| Michael | Zarnowski | Carte International |

The S21 Webex meeting was called to order at 9:25 AM CT with Ben Garcia as chair, Tom Dauzat as vice-chair and George Payerle as secretary. There were 38 members and 37 guests in attendance. Total membership is 51 so there was a quorum. Four guests requested membership.

Membership requirement for 12.24 is that you have attended 2 meetings in a row or 3 of the last 5. Four guests requested membership at the F20 meeting. Christopher Sullivan, Audrey Siebert-Timmer, amd Ramadan Issack met membership requirements and were members at the S21 meeting. Kyle Zemanovic did not qualify due to the 3 in 5 meeting requirement. Dan Mulkey mentioned that Fred Friend had retired and will no longer be attending meetings.

Previously three people qualified and became members at the F20 virtual meeting -- Larry Dix, Fredric Friend and James Spaulding.

George Payerle moved to approve the agenda and Ken Hampton seconded. The motion passed unanimously. Ken Hampton moved to accept the minutes of the fall 2020 virtual meeting Dan Mulkey seconded. The minutes were approved unanimously. The chair called for essential patents. There were no disclosures. The chair showed and explained the copyright slides.

Work on the PAR was begun at the S19 Anaheim meeting. The PAR will expire December 31, 2023. We have 3 working meetings to finalize the draft and get it to review and resolve comments.

Since the F20 meeting, the chair held 2 interim meetings to continue work on the standard. Ben acknowledged the help of the WG members who participated in this effort.

Old Business – the revision of Table 6 was originally meant to reconcile the English and metric dimensions. This has been done. Then it was decided to also address minimum thicknesses of the tank wall, coolers, tank cover, and tank bottom. Once further input from the corrosion task force is received, this work will continue. Will Elliott talked about what will be presented at the corrosion task force meeting.

Next the chair reviewed the items that were discussed at the interim meetings. There was discussion about whether to include the publishing date when citing another standard. Steve Shull pointed out that if we refer to a specific part of a standard, we must include the publishing date since standards are changed over time and the reference might no longer be valid if the standard cited is revised.

Section 5.2 kVA ratings – there was a discussion on the wording of this section as it relates to nonsymmetrical unbalanced loads of wye-wye connected units. Larry Dix said he had seen shunt bundles on small units. Andrew Larison of ABB said that they used 5 leg cores for wye-wye units. Gary King said in smaller units in smaller tanks there would be a tendency to use 3 leg cores.

A motion was made to resolve the issue by referring to C57.105 for information and proper design methods. Brian Klaponski made the motion and Mike Thibault seconded. The motion was passed without objection.

Table 1 was revised to include applied voltage test and induced voltage test. Ken Hampton made a motion to approve the revision and Brian Klaponski seconded. The motion was passed without objection.

Section 5.4 Insulation levels – A suggestion was made by the taskforce to remove the second sentence (stating that BIL ratings are specified in C527.12.00-2015) as it was in direct conflict with the first sentence (stating that BIL ratings are specified in Table 2). The second sentence was deleted.

Brian moved to make the change in the first sentence and delete the second sentence. The motion was approved without objection.

Table 2 was revised to include 16,340 and 17,200 voltages. George Payerle moved and Ken Hampton seconded a motion to make those changes and it was passed without objection.

Section 6.2 editorial change was made adding the word ‘voltage’ in front of “regulation”.

Section 7.1 several non-technical editorial changes were made to this section.

A comment was made during the meeting that parking stand material should match that of the tank. Will Elliott commented that parking stands are required to be stainless steel because it is bare metal (won’t be painted) and is required for corrosion resistance.

Figure 1: Brian K. moved to add a diagram of a round tank to be placed alongside the pre-existing rectangular tank diagram showing dimensional callouts related to the maximum dimension table below. Will E. seconded. It was passed without objection.

There was no new business.

George P made a motion to adjourn which was seconded by Tom D

Next meeting October 17 to 21 (hopefully) I Milwaukee

Respectfully Submitted by: Ben Garcia, Chairman C57.12.24 Working Group

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* **C57.12.40 Secondary Network Transformer** working Group –   
  Dave Blew, Chairman, Dan Schwartz, Secretary
  + Published 2017
  + Revision due date: **12/31/2027**
  + PAR Approval Date: 8/31/2012
  + PAR Expiration Date: **12/31/2023**

Stage: Submitted to Revcom on RevCom Agenda 04-May-2017

IEEE Transformers Committee

**C57.12.40**

**Secondary Network Transformer Working Group**

**Spring 2021 Virtual Meeting Minutes**

**WebEx**

## 10:50 AM CST April 27, 2021

# Members Present Company

Dave Blew (Chair) PSE&G

Dan Schwartz (Secretary) Quality Switch

Douglas Craig Richards Manufacturing Co.

Tom Dauzat Prolec GE

Larry Dix Quality Switch

William Elliott Prolec GE

Mark Faulkner Eaton Corporation

Brad Kittrell Consolidated Edison Co. of NY

Brian Klaponski Carte International Inc

Alejandro Macias CenterPoint Energy

Dan Mulkey Mulkey Engineering Inc.

George Payerle Carte International Inc.

James Ratty Richards Manufacturing Co.

Pedro Salgado Electronic Technology Inc.

Avijit Shingari Pepco

Igor Simonov Toronto Hydro

Adam Sewell Quality Switch

Jeremy Sewell Quality Switch

Travis Spoone Eaton Corporation

John Vartanian National Grid

# Guests Present Company

Scott Abbott PPG

Gregory Ante Southern California Edison

Kevin Biggie Weidmann Electrical Technology

Didier Hamoir Transformer Protector Corp.

Ken Hampton Baltimore Gas & Electric

Jack Harley First Power Group LLC

Robert Kinner First Power Group LLC

Kent Miller T&R Electric Supply

Vinay Patel Consolidated Edison Co. of NY

Eric Theisen Metglas, Inc.

Bruce Webb Knoxville Utilities Board

Bill Whitehead Siemens Energy

Mike Zarnowski Carte International Inc.

\*Requested Membership

* The group met on Tuesday, April 27, 2021 at 10:50 AM CST with 20 members and 13 guests. Zero (0) guests requested membership. Quorum was achieved with 20/29 (69%) of members present.
* A call for patents was made; none were mentioned.
* Copyright requirements were reviewed by the Chair.
* An agenda was presented for approval. Motion to approve was made by Mark Faulkner and seconded by Brian Klaponski. The agenda was approved unanimously.
* The minutes of the October 20, 2020, meeting on WebEx were reviewed. A motion to approve was made by George Payerle and seconded by Jeremy Sewell. The minutes were approved unanimously.
* The Chair reviewed that the PAR was approved and became active May 21, 2019 and expires December 31, 2023.
* Old Business - The Chair reviewed the previous meetings list of topics to be addressed in the next revision of C57.12.40 and the following items were discussed:
  + John Vartanian (National Grid) and Brad Kittrell (Consolidated Edison) presented on Cathodic Protection initiatives at each respective company to provide some background on CP methods used at each company. Both presenters fielded multiple questions.
  + John Vartanian and Brad Kittrell presented on their respective company’s primary switch location methodology regarding safety and operational requirements. Both presenters fielded questions on their respective methodologies.
  + Cory Morgan (Eversource) was to present on primary switch testing requirements; however, he was unable to make this meeting. He will present at the next meeting in the fall.
  + Will Elliott (Prolec GE) presented on the difference in measurements of the two liquid types in Tables 8 & 9. Mike Zarnowski (Carte) presented a recommendation to update wording in Tables 8 & 9 based on fluid type. It was agreed to make the updates in the draft and have discussion and vote on the changes at a later meeting.
  + Dave Blew agreed to conduct research to determine if there are any end users that still require fluids other than mineral oil or FR3 in transformer manufacture; other fluids would include silicone and BETA among others. He will also check with manufacturers to determine if there is any requirement for those fluids in orders.
  + A proposal was provided by Brian Klaponski for removal of Table 7 and updating Section 5.6 wording to accommodate the removal. It was agreed to make the changes in the draft and move any discussion and approval to a later meeting date.
  + There was discussion on developing wording and scoping on improved bushing standardization in the standard for the group to review, but there was some confusion on what the actual request was at the previous meetings. Dave Blew suggested that we should discuss standardizing primary bushing sizing and capacity. Mike Zarnowski agreed to provide wording for the next meeting.
  + Dan Schwartz reviewed C57.12.24 compared to C57.12.40 and identified discrepancies between the two standards. Dave Blew, Mike Zarnowski, and Brad Kittrell agreed to review the list and provide suggestions for trying to keep consistency between the two standards.
  + Type testing for arc withstand was tabled until future meetings due to intellectual property concerns of each manufacturer and if that type of test can be developed.
* New Business – The Chair opened the discussion on any new items the group felt needed to be addressed in the next revision. No new items were brought forward.
* The Chair discussed that we have a few meetings to hash out the proposed modifications to the current revision, but that we must be diligent about doing so in order to finish the next revision in a timely manner.
* The meeting was adjourned at 12:05 PM CST with the next meeting set for Milwaukee, WI on October 20th, 2021.

Respectfully submitted,

D. Schwartz, Secretary

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| **Document #:** | **C57.12.44** |

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| --- | --- |
| **Document Title:** | **STANDARD REQUIREMENTS FOR SECONDAY NETWORK PROTECTORS** |

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| --- | --- | --- | --- |
| **Chair:** | **Mark Faulkner** | **Vice-Chair** | **Alex Macias** |
| **Secretary** | **n/a** |  |  |

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| --- | --- | --- | --- |
| **Current Draft Being Worked On:** | **DRAFT 10** | **Dated:** | **April 26, 2021** |

|  |  |  |  |
| --- | --- | --- | --- |
| **Meeting Date:** | **April 26, 2021** | **Time:** | **3:45PM CT** |

**Meeting Attendance**

Activity Name: C57.12.44 WG Secondary Network Protectors  
Activity ID:   
Number of Members in Activity = 20  
Number of Members Present = 16  
Quorum Present = 80%  
Number of attendees = 22

|  |  |  |
| --- | --- | --- |
| Dan Schwartz | Quality Switch | member |
| Dan Mulkey | Dan Mulkey Consultant | member |
| Brian Klaponski | Carte | member |
| Thomas (Tom) Dauzat | Prolec/GE | member |
| pedro salgado | ETI-NJ | member |
| George | Carte | member |
| James Ratty | ETI-NJ | member |
| Jeremy Sewell | Quality Switch | member |
| Travis Spoone | Eaton | member |
| Alex Macias | CenterPoint Energy | member |
| DougC | Richard Mfg. | member |
| john vartanian | National Grid | member |
| Mark Faulkner | Eaton | member |
| Igor Simonov | Tornoto Hydro | member |
| Brad | ConEd | member |
| Will Elliott | Prolec/GE | member |
| Malia Zaman | IEEE | guest |
| Kevin Biggie | Weidmann | guest |
| Duy Vo | Central Maine Power | guest |
| Vinay | ConEd | guest |
| Michael Zamowski | Carte | guest |
|  |  |  |

**Meeting Minutes:**

The minutes shall record the essential business of the Working Group, including the following items at a minimum:

1. Meeting called to order
   1. 3:47 PM
2. Quorum Verification
   1. Quorum was confirmed via Encore polling process
3. Confirmation of the essential patent statement and responses
   1. No conflicts presented to group
4. Copyright requirements were reviewed by the Chair
5. Approval of minutes of the previous meeting
   1. Minutes presented to group
   2. Motion to approve Dan Mulkey, 2nd George P.
   3. Minutes approved unanimously
6. Approval of agenda for this meeting.
   1. Agenda presented to group=
   2. Agenda approved unanimously
7. Meeting Discussion
   1. Ballot approval process
      1. **Chair to make motion to the Subcommittee to obtain approval for ballot** 
         1. **Brain K. made a motion (2nd Dan Mulkey) was presented to the WG to send the current draft of the standard to the Subcommittee**
         2. **WG approved unanimously**
      2. Deadline to submit is October 18, 2021
   2. Pending response of MEC review
      1. Task Group (TG) to make changes recommended by MEC; any conflicts to be address with MEC
      2. TG: Mark Faulkner, Doug Craig, Dan Mulkey and Cory Morgan
   3. Releasing Standard for approval/comments
      1. TG to address all comments submitted
      2. Any technical comments to be addressed by TG and then presented to the WG members
8. PAR expiration confirmed to be 12/31/2021
9. Meeting adjourned at 5:00 pm
10. Fall meeting--date and location
    1. Milwaukee, Wisconsin, USA
    2. Date: October 17-21, 2021

Submitted by: Mark Faulkner

Date: 04/28/2021

* 1. **C57.167 Guide for Monitoring Distribution Transformers** working group – Gary Hoffman, Chairman, Mike Thibault, Secretary o Revision due date: **N/A – new standard**
  2. o PAR Approval Date: **6/14/2018**
  3. o PAR Expiration Date: **12/31/2022**

Gary said he will summarize the meeting in the Dist SC but highlighted that the survey on load tap changers was conducted and several meetings have been held in 2020. There are plans for a January 2021 Google poll to STNP and DIST

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| --- | --- |
| **Document #:** | **n/a** |

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| **Document Title:** | **Corrosion Effects on Subsurface Transformers** |

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| --- | --- | --- | --- |
| **Chair:** | **Will Elliott** | **Vice-Chair** | **Justin Minikel** |
| **Secretary** | **Audrey Siebert-Timmer** | **Per Cent Complete** | **0** |

|  |  |  |  |
| --- | --- | --- | --- |
| **Current Draft Being Worked On:** | **n/a** | **Dated:** | **n/a** |

|  |  |  |  |
| --- | --- | --- | --- |
| **Meeting Date:** | **April 27, 2021** | **Time:** | **2:20 PM CST** |

|  |  |  |  |
| --- | --- | --- | --- |
| **Attendance:** | **Members** | **28** |  |
|  | **Guests** | **50** |  |
|  | **Total\*** | **78** |  |

**\* For details of attendance, please refer to AMS system of the Transformers Committee**

**Attending Members:**

Martin Bachand, Cloverdale Paint Inc.

Thomas Dauzat, Prolec GE

William Elliott, Prolec GE

Benjamin Garcia, Southern California Edison

Zoran Goncin, Partner Technologies Inc.

Chris Guertin, Cloverdale Paint Inc.

Said Hachichi, Hydro-Quebec

Jane Hall, Cloverdale Paint Inc.

Ramadan Issack, American Electric Power

Robert Kinner, FirstPower Group LLC

Brad Kittrell, Consolidated Edison Co. of NY

Brian Klaponski, Carte International Inc.

Justin Minikel, EATON Corporation

Tyler Morgan, Duke Energy

Daniel Mulkey, Mulkey Engineering Inc.

Dwight Parkinson, EATON Corporation

George Payerle, Carte International Inc.

James Ratty, Electronic Technology Inc.

Pedro Salgado, Electronic Technology Inc.

Adam Sewell, Quality Switch, Inc.

Avijit Shingari, Pepco Holdings Inc.

Audrey Siebert-Timmer, IFD Corporation

Igor Simonov, Toronto Hydro

Jonathan Sinclair, PPL Electric Utilities

Edward Smith, H-J Family of Companies

Michael Thibault, Pacific Gas & Electric

Alan Traut, Howard Industries

John Vartanian, National Grid

**Attending Guests**

Scott Abbott, PPG

\*Nabi Almeida, Prolec GE

Greg Ante, Southern California Edison

Edmundo Arevalo, Bonneville Power Administration

Elise Arnold, SGB-SMIT Group

Ryan Bishop, Minnesota Power

Darren Brown, Howard Industries

Erich Buchgeher, Siemens Energy

\*Paul Chisholm, IFD Corporation

Rhett Chrysler, ERMCO

Michael Dahlke, Central Moloney, Inc.

Paul Florida, Howard Industries

James Gardner, SPX Transformer Solutions, Inc.

Carlos Gaytan, Prolec GE

Ken Hampton, Baltimore Gas & Electric

George Jalhoum, PPL Electric Utilities

Kristin James, EATON Corporation

Anna Johnson, Arkem

Krzysztof Kulasek, Hitachi ABB Power Grids

Michelle Kutzleb, TJ|H2B

Andrew Larison, Hitachi ABB Power Grids

Christopher Lianides, Southern California Edison

Tiffany Lucas, SPX Transformer Solutions, Inc.

\*Alejandro Macias, Centerpoint Energy

Nitesh Patel, Hyundai Power Transformers USA

Vinay Patel, Consolidated Edison Co. of NY

Chris Pitts, Howard Industries

Jarrod Prince, ERMCO

Jonathan Reimer, Fortis BC

Mahesh Sampat, Independent Consultant

Anil Sawant, Virginia Transformer

Jeff Schneider, Spire Power Solutions

\*Dan Schwartz, Quality Switch, Inc.

Jeremy Sewell, Quality Switch, Inc.

Jaber Shalabi, Virginia Transformer

Dave Sheehan, HICO America

Stephen Shull, BBC Electrical Services, Inc.

James Spaulding, City of Fort Collins

Neil Strongosky, Memphis Light, Gas & Water

Marc Taylor, Cogent Power Inc.

Eric Theisen, Metglas

Timothy Tillery, Howard Industries

Jeremy Van Horn, IFD Corporation

D Cenral Maine Power

\*Hugh (Mike) Waldrop, Memphis Light, Gas & Water

Shelby Walters, Howard Industries

Daniel Weyer, Nebraska Public Power District

Leon White, H2 Scan

Alan Wilks, Independent Consultant

\*Michael Zarnowski, Carte International Inc.

Kyle Zemanovic, EATON Corporation

*(\*Attendee requested membership)*

**Meeting Minutes:**

1. Will Elliott called the meeting to order at 2:20 PM CST.
2. Opening remarks and announcements.
3. Will Elliott reviewed IEEE Essential Patent Claims and SA Copyright Policy. No issues were raised.
4. Membership changes were noted:
   1. Added: Juan Carlos Cruz Valdes, Zoran Goncin, Said Hachichi, Jane Hall, Micheal Morgan, Aniruddha Narawane, James Ratty, Pedro Salgado, Jonathan Sinclair, Edward Smith
5. Quorum was verified. The working group consisted of 36 members, requiring **19** for quorum. **26** members were confirmed through the WebEx poll. **28** members were confirmed afterwards through the attendance records.
6. Will Elliott requested approval of the minutes. George Payerle made a motion, seconded by Tom Dauzat for approval of the minutes. **Minutes were unanimously approved.**
7. Will Elliott requested approval of the agenda. Martin Bachand made a motion, seconded by Brian Klaponski for the approval of the agenda. **Agenda was unanimously approved.**
8. New Business:
   1. Historical Corrosion Reports
      1. Will Elliott review historical corrosion reports that are available including:
         1. 1968 GE corrosion report by Gary Nonken which is likely the origin of AISI 409 for 1-ph submersibles.
         2. 1968 IEEE transaction article “Fundamentals of Corrosion and Corrosion Control for Residential Subsurface Transformers” also by Gary Nonken from GE.
         3. 1972 IEEE transaction article “Corrosion Experience with Subway Transformers” by John Donnelly from Boston Edison.
         4. 1991 GE / ConEd corrosion report. Will Elliott has a request in process to release the this to the taskforce.
   2. Material Compatibility Testing: Pitting Corrosion 3D CT-Scan Results
      1. Will Elliott reviewed 3D CT-scan test method and results performed on samples from the material compatibility tests. This test was performed in attempt to provide a more accurate measurement for pitting depth (vs the caliper method used in the Fall 2020 report). Reviewed report will be posted in the website. Key findings / observations were:
         1. Corrosion Rate was highest with Silicon-Bronze materials (results were comparable to previous findings in the Fall 2020 report). It was noted that measured corrosion rates do not reflect actual service environments, but rather indicate relative performance.
         2. Silicon-Bronze materials had a large percent pitted surface area.
         3. Coating bare Copper cathode reduced corrosion rate.
         4. Easier machinability of stainless-steel alloys come at the cost of corrosion resistance.
      2. Tiffany Lucas asked samples were weight to calculate mass loss. Will Elliott confirmed this measurement was taken; results are included in the Fall 2020 report.
      3. Tom Dauzat commented that the bare copper cathode is simulating exposed copper in the vault.
      4. Zoran Goncin asked if pitting corrosion was observed on the threads. Will Elliott responded that none was observed. Tom Dauzat commented that this may be due to the test set up (bolts torqued together) which likely did not allow the electrolyte solution to go between tthreads.
      5. Zoran Goncin asked why 316 stainless-steel was not included. Will Elliott commented that one of the early questions for the task force was hardware compatibility and the materials tested are explicitly permitted for hardware in the current STNP equipment standards (so the materials selected were the ones they had readily available on hand).
      6. Zoran Goncin commented that they do not use 304 stainless steels because of galling. instead, they used 316 stainless steels. In these cases, they also recommend all components are 316 stainless steel rather than carbon steel.
   3. Taskforce Discission: Next Steps
      1. Will Elliott reviewed the proposed draft which was compiled as an informative guide for the equipment user. Proposed draft was emailed to taskforce members and included the following sections:
         1. Guide Purpose
         2. Methods to Defining the Environment
         3. Vault Design Considerations
         4. Design Considerations for Equipment Enclosures with Superior Corrosion Resistance
         5. Cathodic Protection Guide
         6. Proposed Simulated Vault Corrosion Test Method
      2. Tom Dauzat asked about annealing for stress relaxation and SCC (stress corrosion cracking). Will Elliott commented there is a lot to the welding process.
      3. Tiffany Lucas commented that austenitic stainless steels can be susceptible to SCC and a stress relief heat treatment will help to prevent that. Tiffany commented that this is related to welding guidelines and we may not want to include this.
      4. Tom Dauzat commented that for paint touch-ups it is best to paint the entire affected area as it provides a coating that will limit crevices for corrosion.
      5. Dan Mulkey commented that the vast majority of subsurface transformers are installed in enclosures / chambers / spaces that are very small. Dan Mulkey recommended we distinguish the difference between a vault installation (e.g. where there is additional room around the transformer for crews to walk around) vs “surface operable” (e.g. where there is no additional room around the transformer). The He stated the available space likely will define what you can or cannot do.
      6. Tom Dauzat commented that for 300 stainless-steel transformers it is difficult for crews to see a pin hole leak versus cooper bearing and/or 409 stainless-steel has a uniform rust/corrosion making it easier for crews to identify when to service the transformer.
      7. Dan Mulkey commented that standard installation processes have a bare copper ground rodver the vast majority installation will have the rod above water. Will Elliott agreed that keeping the copper out of the electrolyte will make a big difference, but cautioned what certainty we know where the water level is. commented that corrosion rates will likely be much lower in this case.
      8. Dan Mulkey commented that soil likely will change over time. Something to consider when soil testing water.
      9. Brad Kittrell commented that ConEd replaces anodes all the time (crews have spare parts in the truck). They use a “passive” (galvanic “sacrificial” anode) system.
      10. Tom Dauzat commented that painting the bare copper in the vault would extend the life of the anodes.
      11. Tom Dauzat made a motion for developing a PAR for a guide on corrosion (similar to what is available for Tap Changers). **There was no second, motion did not pass.**
      12. Edmundo Arevalo commented he would like the information to be included in the transformer specification.
      13. Brain Klaponski commented that it may be too early for a PAR. We need to continue gathering data to focus the scope (there is a lot in the proposed draft).
      14. Dan Mulkey commented the best time to submit a PAR in December as you get an extra year.
      15. Discussion was tabled as we ran out of time. **Will Elliott to call a meeting in two months to discuss further and assign out actions.**
9. Next meeting: is planned for October 18, 2021 in Milwaukee, Wisconsin USA
   1. The following seven attendees requested membership, and five will be added to membership for the Fall 2021 meeting: 6 requested membership … need attendance sheet.
      1. Attendees requesting membership which were approved based on attendance:
         1. Nabi Almeida, Prolec GE
         2. Paul Chisholm, IFD Corporation
         3. Alejandro Macias, Centerpoint Energy
         4. Dan Schwartz, Quality Switch, Inc.
         5. Mike Waldrop, Memphis Light, Gas & Water
      2. Attendees requesting membership which did not meet attendance criteria:
         1. Michael Zarnowski, Carte International Inc.
         2. Ashmita Niroulaa, Ergon
10. **The meeting was adjourned at 3:35 PM CST.**

Submitted by: Audrey Siebert-Timmer

Date: 04/26/2021