# Distribution Subcommittee – Chair: Stephen Shull

**March 26, 2014**

**Savannah, Georgia**

**Chair: Stephen Shull  
Vice-Chair: Jerry Murphy**

## General Opening

Steve opened the meeting welcoming everyone to the meeting. Jerry circulated the rosters. To establish a quorum, a list of members were displayed and a count of was made. We did have a quorum with 29 of the 51 members in attendance.

The agenda was reviewed and motion made by Gael Kennedy, seconded by Kent Miller and approved by unanimous acclamation of the members in attendance.

The Fall 2013 meeting minutes were reviewed and motion made by Phil Hopkinson, seconded by Ed Brush and approved by unanimous acclamation of the members in attendance.

## Working Group and Task Force Reports

### C57.12.36 – Distribution Substation Transformers – Jerry Murphy

Jerry presented the following minutes from the working group meeting on March 25, 2014 at 1:45 PM in with 49 in attendance.

Jerry called the meeting to order. Introductions were made. The names of the members were projected on the screen. By a show of hands the quorum was reached by having 12 out of the 19 members present.

The minutes of the Fall 2013 meeting in St. Louis were presented. A motion was made by Gael Kennedy and seconded by Ron Stahara to approve the minutes as written. The minutes were approved unanimously.

Jerry informed that he had sent Draft 3 of the standard to all the WG membership encouraging them to review this draft so that any issues could be raised, discussed and resolved. All the changes that had been discussed in the past meetings were already incorporated.

This draft was projected on the screen to show the changes that had been incorporated. Craig Colopy requested the review of this document to the members of the WG C57.15 that were in attendance, considering their work with the joint IEEE/IEC standard process.

Bob Olen explained how the IEEE SA system worked, to ensure that the membership would be included in this system, so that they can receive any future invitation to ballot.

Jerry asked the group for a motion for a straw ballot to proceed to start a ballot process, considering that the document was ready to go through this process. A motion on this regard was made by Ron Stahara and seconded by Gael Kennedy. The motion was approved unanimously.

Jerry then informed that he would send the document to IEEE in April, so that the balloting process could be approved soon, and he once again requested the group to review the document and provide any comments.

There was no additional new business, and the meeting was adjourned at 2:05 PM.

Jerry made a motion before the subcommittee to move the standard to ballot, seconded by Gael Kennedy and the motion was approved by unanimous acclamation of the subcommittee members in attendance without further discussion.

### C57.15/IEC 60076-21 – Step-Voltage Regulators – Craig Colopy

Craig presented the following minutes from the working group meeting on March 24, 2014 at 4:45 PM with 41 persons in attendance.

Craig opened the meeting by welcoming everyone. Craig asked the attendees to introduce themselves. Since this task force had just been formed and was working at this time without a PAR, Members are still being added. Those in attendance were asked to approve the agenda for this meeting. It was the general consensus that the agenda was correct. The St Louis unapproved Minutes were presented but because there was no task force at that time, it was determined that no approval was needed. Rosters of interested parties were passed out for additional individuals to sign up for Task Force Membership.

Craig updated the group on the status of PAR and DC (IEC Document for Comment.) Member nations are supposed to respond by May 9th, 2014 to this DC. Jodi Haasz commented that RevCom will meet Wednesday to consider the IEEE PAR request. It is anticipated that this will be approved.

Craig stated that he would like to do some preliminary work in some areas before next meeting which is scheduled in the Fall. The following areas were target and individuals assigned to work on these topics.

1. Sound Levels as per Brazil (NBR11809) – 2014 - Craig Colopy
2. C57.12.00 and C57.12.90 Revisions – review changes to see effects on this Standard. The volunteers were Giuseppe Termini and Wally Binder
3. Investigate the 55 and 65°C Average Winding rise and associated Hot Spot Rise. It was pointed out that IEEE’s ambient is not the same as IEC. Therefore, Craig cautioned the volunteers to be careful in their review The volunteers were Jennifer Yu and Aleksandr Levin,
4. External Dielectric Clearances harmonization. The volunteers were Dan Sauer and Fred Friend
5. On-Load Tap Changer Section (IEC 60124-1 & NBR 11809) - The volunteers were Axel Kraemer, Lee Matthews, Chuck Simmons and Craig Colopy.
6. Develop a Tank Rupture Test and/or Cover retention based on the work being done in PCS57.12.39. The volunteers were Dan Mulkey, Jim Harlow, Justin Pezzin, and Said Hachichi.
7. Routine and Design Partial Discharge (150 BIL and higher) tests There were no volunteers.
8. Sound Level Requirements and Tests. The volunteers were Lee Matthews and Martin Rave.
9. Control/Apparatus Compatibility tests which could include status, control access, SCADA, etc. The volunteers were Craig Colopy, Dallas Jacobsen, Murty Yalla, Steve Shull, and Anil Dhawan.
10. Universal Interface between the apparatus and control with consideration of Safety, Liability, etc. The volunteers were Steve Shull, Anil Dhawan, Tas Taoussakis, and Craig Colopy.
11. A discussion concerning the topic of “Bypass off Neutral Position” which was to be targeted to an Annex. This annex would consider covering such topics as Safety, equipment failures, determination of neutral position, etc. The volunteers were Craig Colopy, Dan Mulkey, Chuck Simmons, and Mike Miller.
12. An Annex that would discuss overload, probability of different operations, and other no previous covered items. The volunteers were Dallas Jacobsen and Jim Harlow
13. Special considerations for Ester Based fluids. Alan Peterson volunteered to do this.
14. The Control Design and Testing: This currently discussed in section Section 9 of the current standard. Murty Yalla volunteered to do this.

The meeting ran out of time and there was a motion made by Lee Matthews to adjorn with a second by Mike Miller. The motion was carried by unanimous approval.

### C57.12.20 – Overhead Distribution Transformers – Alan Traut

Alan presented the following minutes from the working group meeting on March 24, 2014 at 11:00 AM with 53 in attendance.

Al Traut asked for the Introduction of members and guests.

Al Traut provided the Chair’s Report. The current PAR expires December 31, 2016. The 10-year cycle ends December 31, 2021. Al stressed that balloting needs to occur by 2015 or early 2016 to meet the December 31, 2016 PAR expiration date.

A quorum of the working group members was present (26 out of 33 members were present).

The minutes of the fall 2013 St. Louis meeting were discussed and approved.

Al Traut led the first discussion of old business on proposed transformer minimum impedance values. The typical values in his presentation came from the Department of Energy’s recent work on distribution transformer efficiency values. The minimum impedance values were derived based on various panel breaker sizes. Discussion was held on including maximum impedance values, but the working group decided against this. Some felt that the proposed single-phase impedance values should be compared with those of 3-phase padmount transformers as a check. Al Traut will make the meeting slides available to everyone who attended the meeting as well as provide a summary of his approach in deriving the minimum impedance values. Adam Bromley and Chuck Simmons volunteered to assist Al Traut on the wording for the minimum impedance section.

The last item of old business discussed was regarding platforms for mounting overhead type transformers. Some larger transformers may require a platform for mounting due to increases in total weight as a result of the DOE efficiency requirements. The working group feels that the transformer base mounting capabilities need to be addressed in the standard. The group agreed that the standard should include a maximum weight beyond which transformers should be mounted on platforms. Concern on the weight limit of the different types of mounting brackets (adapter plates) was also discussed as some of these limits could be exceeded by future transformer designs. The group agreed that a weight limit needs to be defined for these mounting brackets (adapter plates). The group discussed this information being included in an informative annex. Dan Mulkey, Ali Ghafourian and Chuck Simmons agreed to work with Al Traut on putting together a summary of what some users are doing with platforms and send to the working group.

Under new business, Darren Brown questioned the grounding of the X2 bushing on the top four schematics of Figure 6. His concern was that by showing the X2 grounded, users may interpret this to mean that all X2 bushings should be grounded when it is only required that the X2 bushing be grounded on 120/240 Volt secondary designs. Following discussion, a motion was made (Allen Wilks / Darren Brown) to delete all X2 ground connections from Figure 6. The motion passed with 14 approving and 3 dis-approving.

The last discussion under new business involved which bushing should be grounded on single-phase overhead type transformers with four secondary bushings. Chuck Simmons will add language to the current draft and present to the working group at the next meeting.

Meeting was adjourned at 12:13 PM.

### C57.12.34 – Three Phase Padmount Transformers – Ron Stahara

Ron presented the following minutes from the working group meeting on March 24, 2014 at 3:15 PM with 64 in attendance.

Ron Stahara called the meeting to order and introductions were made. The rosters were circulated. The complete detail of attendance is recorded in the AM system. To establish a quorum, a members list was displayed on the screen and those who saw their names were asked to hold up their hand. From this count of hands, it was determined that a quorum was established. A motion was made by Marty Rave and seconded by Ed Smith to accept the minutes of the Fall 2013 meeting as written as well as agenda for this meeting. The motion was pasted unanimously.

The discussion continued on the meaning of “permanently affixed”. The original clause in the document was as follows:

**8.8 Instruction nameplate**

**8.8.1 Location**

The instruction nameplate shall be located in the low-voltage compartment and shall be readable with the cables in place. When the nameplate is mounted on a removable part, the manufacturer’s name and transformer serial number shall be permanently affixed to a non-removable part.

After some discussion it was reformed to the following:

**8.8.1 Location**

The instruction nameplate shall be located in the low-voltage compartment and shall be readable with the cables in place. If the nameplate is mounted on a removable part, the manufacturer’s name and transformer serial number shall be attached to the tank in such a way to have equal or greater life expectancy than that of the transformer.

A motion was made by Jerry Murphy and seconded by Said Hachichi to accept this change. The motion pasted unanimously.

A discussion was continued from the fall meeting concerning the location of the H0 bushing. The group reviewed the drawings showing the H0 bushing as discussed in the last meeting. These were figures 2, 3, 6, 7, 10, 11,13A, 13B, 14A, 14B, and 14C. After some discussion, it was felt that the all of these were acceptable except the loop feed deadfront units. A concern was expressed that the position of the bushing in the example figure shown below may be in the way of cabling and connections at the higher voltage and current ratings.



Although this location had been shown to work for 200A, 15kV class installations, the higher voltage ratings and the 600A interfaces may be unable to be accommodated when the bushing was at this location. There was a lot of discussion concerning this and the conclusion was that the bushing will be moved to either above the H1A bushing well or the H1B bushing well. The preferred location was to be above the H1B bushing well. A motion was made to this effect by Michael Miller and seconded by Mike Faulkenberry. The motion pasted unanimously. Steve Shull was to make corrections to the affected drawings.

The document was discussed in general as a review of its content. There were a number of items discussed most of which were editorial in nature. Ron brought a comment to the group concerning the footnote b in Table 3. There were questions from the group as to if these footnotes in the Table would be a part of the standard. Steve was to verify that this was the case in that these footnotes provided valuable information to the standard. However, footnote b was a concern for the group. It appears that the technology has been developed to such a point as to allow for a 200 kV BIL separable connector and this statement may need to be corrected. Ron was not sure that the document was written to be used up to this level. After some discussion it was asked that Steve Shull do a minutes search to verify this was the case. As a side note, this was done and the following is an excerpt from the Fall 2006 Minutes:

*A discussion ensued concerning the 34,500 Δ BIL level shown in the document as well as associated kVA ranges. It was decided by consensus that the 34,500 GrdY/19,920 kVA levels would be used for this voltage. Some discussion was followed by a motion made by Iqbal Hussain and seconded by Myron Gruber to change the BIL level to 150kV to match the BIL of the 34,500 GrdY/19,920 kVA. It was further clarified by changing the Table 1 footnote d to the following; ”The highest BIL level for separable insulated connectors is 150 kV BIL. If 200 kV BIL level is required, bushings must be used.” The amendment to the motion and the motion both passed.*

These notes indicate that this was the intent of the standard.

Steve would investigate this connector. Comments from the group will be solicited to determine the disposition of the information that he hopes to discover.

Alex Macias asked why this document didn’t provide for accessories such as fuses and switches. It was pointed out in the discussion that some of the underground transformers have these items included in their standards. Steve Shull commented that these items have never been in the document since he had been part of the group and he was told by his predecessors that they should not be included. Ron pointed out that Gerry Paiva had work to get these items removed when he was a part of the group. Giuseppe Termini and Dan Mulky commented that switches and fuses should be considered since these were necessary when applying these units at the higher voltages or when loopfeed designs are required. Brian Klaponski stated that since we were concerned about the unsophisticated user in the document, it appeared to him that a reference to these items should be consider as some part of the document simply as a safety precaution. Ron said that we would get with Gerry and see if Gerry could remember the spirit and intent of why these types of accessories were removed from the standard.

Since the meeting was running low on time, Ron ended the discussion and shared that at the next meeting we would have to move this document to ballot. He said that Steve Shull would be getting the changes made to the document in the next month and would circulated it to the group for comment. He would like to have any changes or corrections finalized by the next meeting. With this a motion was made to adjourn by Paul Chisholm and seconded by Mike Faulkenberry. The motion pasted unanimously.

### C57.12.28, C57.12.29, C57.12.30, C57.12.31, C57.12.32 – Enclosure Integrity – Bob Olen

Bob presented the following minutes from the working group meeting on March 25, 2014 at 8:00 AM in with 56 in attendance.

**C57.12.28, Standard for Pad-Mounted Equipment – Enclosure Integrity**

* **Published 9/30/2005, Revision Due date 12/31/2018**
* **PAR Approved 30-Sep-2010, Expires 12/31/2014**

**C57.12.29, Standard for Pad Mounted Equipment - Enclosure Integrity for Coastal Environments**

* **Published 10/11/2005, Revision Due date 12/31/2018**
* **PAR Approved 30-Sep-2010, Expires 12/31/2014**

**C57.12.30, Standard for Pole-Mounted Equipment - Enclosures for Coastal Environment**

* **Published 9/20/2010, Revision Due date 12/31/2020**
* **PAR Approved N/A, Expires N/A**

**C57.12.31, Standard for Pole-Mounted Equipment - Enclosure Integrity**

* **Published 9/20/2010, Revision Due date 12/31/2020**
* **PAR for Corrigenda** (SCAB Corrosion Test /4.5.6) **Approved 6-Mar-2013, Expires 12/31/2017**

**C57.12.32, Standard for Submersible Equipment – Enclosure Integrity**

* **Reaffirmed 3/7/2008, Revision Due date 12/31/2018**
* **PAR Approved N/A, Expires N/A**

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

* Quorum was established
* Ron Stahara motioned, and Justin Pezzin seconded, to approve the minutes of the previous meeting on October 22, 2013 in St. Louis, Missouri. The motion was approved unanimously.

**Discussion of C57.12.31 Standard for Pole-Mounted Equipment - Enclosure Integrity:**

Bob Olen reported on the ballot for the corrigenda to correct Section 4.5.6, Simulated Corrosive Atmospheric Breakdown (SCAB), on page 8, which should require 10 SCAB cycles not the 15 that is stated in the 2010 Standard.

* The Ballot Results were:
  + 63Affirmative
  + 4 Negative
  + 94% Affirmative (passed > 75%)
* This corrigenda was submitted to REVCOM on February 21, 2014.

**Discussion of C57.12.28 Ballot Standard for Pad-Mounted Equipment – Enclosure Integrity:**

* The Re-Circulation Ballot Results were:
  + 97Affirmative
  + 5 Negative
  + 95% Affirmative (passed > 75%)
* This revision was submitted to REVCOM on February 21, 2014

**Discussion of C57.12.29 Ballot Standard for Pad Mounted Equipment - Enclosure Integrity for Coastal Environments:**

* The Re-circulation Ballot Results were:
  + 91 Affirmative
  + 6 Negative
  + 93% Affirmative (passed > 75%)
* This revision was submitted to REVCOM on February 21, 2014.

Discussion of C57.12.32 - Standard for Submersible Equipment – Enclosure Integrity:

The chair noted that the standard will expire in 4 years it is time to take out a PAR for revision. Al Traut motioned and Ron Stahara voted to go forward and submit a PAR for revision. There was much discussion around the Scope and the Purpose. Currently there is confusing language with “enclosure” being used for both the outer skin of the equipment and for the enclosure/vault/box in which the equipment is placed.

A group was formed to work on the scope and par between meetings. The volunteers were: Al Traut, Chuck Simmons, Adam Bromley, Giuseppe Termini, Anil Dhawan, Arvin Joshi, Bill Wimmer, Dan Mulkey, and Bob Olen

Dan Mulkey will attempt an initial layout of testing sequence for coatings that are on ferrous metal followed by testing for coatings that are on non-metallic or stainless substrates

Concluding Remarks

The next meeting will be in October 2014 in the Washington, D.C. area.

### C57.12.37 – Test Data Reporting – John Crotty

John presented the following minutes from the working group meeting on March 25, 2014 at 3:15 PM.

John made a motion before the subcommittee to move the standard to ballot, seconded by Gael Kennedy and the motion was approved by unanimous acclamation of the subcommittee members in attendance without further discussion.

### C57.12.38 – Single Phase Padmount Transformers – Mike Faulkenberry

Mike presented the following minutes from the working group meeting on March 24, 2014 at 1:45 PM in with 51 in attendance.

Ali Ghafourian opened the working group meeting at 1:45 p.m. Twenty-nine of thirty-four working group members were present and a quorum was established. The attendees are recorded in the AM System.

The minutes of the meeting had previously been posted on line and a copy was emailed to the working group members. A motion was made by Ron Stahara to approve the minutes from the fall 2013 meeting, it was seconded by Kent Miller, and the motion was passed unopposed by the working group members.

Ali presented the ballot results. The participation rate was 85% and the approval rate was 98%. There were 32 comments, one of which resulted in a negative ballot.

Mike Faulkenberry led a discussion of only those ballot comments that needed working group approval as follows:

**Page 19; Figure 6;** NEGATIVE BALLOT

**Comment:**

My comments are in regard to Figure 6 - Low Voltage Spacing for LV Ratings E, E/E1Y, and E/2E. The illustration for E/2E and the arrangement for the LV bushing terminals X1-X2-X3-X4 are used for either 120/240 V or 240/480 V rated windings. The illustrations in Table 7- Number of low-voltage terminals and arrangement for single-phase transformers in C57.12.20 specify that the LV bushing terminal arrangement X1-X2-X3-X4 are available for 167 kVA and above - up through 500 kVA in the case of C57.12.20. Is this implied in PC57.12.38 D1.4 as well?

**Proposed Change:**

I would add the following as part of Figure 6 in PC57.12.38:

Four low-voltage external terminals suitable for series, multiple, or three wire operation (120/240 or 240/480) - 167kVA and 250 kVA. Connect X2 to X3 externally for series operation. Connect X2 to X4 and X3 to X1 externally for multiple operation.

**Resolution (Agreed to by Working Group Members):**

A note will be placed at the bottom of Figure 5, rather than Figure 6 as suggested, that says, “The E/2E Low-Voltage rating with four external terminals, for example 120/240 V or 240/480 V, is suitable for series, multiple, or three-wire service. Connect X2 to X4 and X3 to X1 for multiple operation. Units shall be shipped connected for three-wire operation with X2 connected to X3 and to the tank.” It was agreed that it would be applicable to all kVA sizes since the top cannot be removed from pad-mounted transformers for internal rewiring. So no statement as to kVA size for which it is applicable was necessary.

**Page 20; Subclause 10.1; Line 4**

**Comment:**

Reference to C57.91 should be changed to C57.12.00

**Proposed Change:**

IEEE C57.91 include overloads that could result in a transformer not remaining effectively sealed. IEEE C57.12.00 identifies Usual Service Conditions and I believe the expectation for the transformer remaining sealed is based on operating conditions spelled out in C57.12.00. I propose that the last sentence of Section10.1 be changed to read, "The transformer shall remain effectively sealed for a top-oil temperature of -5 degrees C to +105 degrees C continuous and under operating conditions as described in IEEE Std C57.12.00."

**Resolution (Agreed to by Working Group Members):** This change will be made.

**Page 14; Subclause 7.6; Line 11**

**Comment:**

I question the use of the term "lifting lugs" since this is typically accomplished with bolts screwed into female threaded bolt holes.

**Proposed Change:**

I propose that the last sentence of Section 7.6 be changed to read, "The safety factor is based on using all lifting provisions as instructed by the manufacturer." The company that I work for has encountered issues with bolts being used in the lifting provisions that were too long. Manufacturers should advise customers on the size, grade and length of bolts to be used to lift their specific transformers.

**Resolution (Agreed to by Working Group Members):** This change will be made.

**Page 13; Figure 3**

**Comment:**

Drawing title needs to include the term, "Type 1 arrangement".

**Proposed Change:**

I propose that the title for this drawing include "Type 1 arrangement" as that is included in the titles for Figures 1A, 1B, 2A and 2B. I propose the title for Figure 3 be changed to, "Figure 3 - Type 1 arrangement, live-front, high-voltage bushings, interchangeability dimensions".

**Resolution (Agreed to by Working Group Members):** This change will NOT be made as the working group felt that putting “Type 1 arrangement” in the title could lead to confusion.

**Page 10; Figure 2A**

**Comment:**

Drawing title needs to include the term, "small interface".

**Proposed Change:**

I propose that the title for Figure 2A be changed to, "Type 2 arrangement, small interface separable connectors, interchangeability dimensions". The title for Figure 2B includes the term "large interface", so I feel that Figure 2A should include the term "small interface".

**Resolution (Agreed to by Working Group Members):** After referring to IEEE Std 386, the term “small interface” was not found in the document. Therefore, this change will NOT be made, but it will be tabled until the next revision and researched further.

**Page 7; Figure 1A**

**Comment:**

Drawing title needs to include the term, "small interface".

**Proposed Change:**

I propose that the title for Figure 1A be changed to, "Type 1 arrangement, small interface separable connectors, interchangeability dimensions". The title for Figure 1B includes the term "large interface", so I feel that Figure 1A should include the term "small interface".

**Resolution (Agreed to by Working Group Members):** After referring to IEEE Std 386, the term “small interface” was not found in the document. Therefore, this change will NOT be made, but it will be tabled until the next revision and researched further.

**Page 4; Subclause 4.2; Table 2**

**Comment:**

In Table 2 (Electrical Characteristics and Minimum Electrical Clearances of High-voltage Bushings and Low-voltage Terminals for Live-front Transformers) on page 4, the values for "60 Hz dry 1 min withstand (kV)" associated with 18000 and 25000 Maximum nominal system voltages are different (the value for 18000 Volts is 42kV and the value for 25000 Volts is 60kV). Since the BIL values are the same, shouldn't the 60 Hz dry 1 min withstand (kV) values be the same?

**Proposed Change:**

I propose that these values be confirmed and changed if listed incorrectly.

**Resolution (Agreed to by Working Group Members):** Dan Mulkey stated that the 18000 volt entry in the table is not found in other standards and was probably added by someone at some point. Steve Shull made a motion that the 18000 volt line be removed from Table 2. The motion was seconded by Kent Miller, and the working group unanimously approved the motion. The 60 kV entry for the 25000 volt line was called in question, and it will be checked and verified as correct.

**Page 3; Subclause 3.0; Definitions**

**Comment:**

Is there a reason that "Ultimate Stress" isn't defined in Section 3 (Definitions)? Since "Working Stress" is defined, I think that "Ultimate Stress" should be defined in Section 3 at the top of page 3.

**Proposed Change:**

Define "Ultimate Stress" in Section 3 (Definitions).

**Resolution (Agreed to by Working Group Members):** Dan Mulkey suggested that the definition might already be in the IEEE Definitions. A check will be made before a definition is added to the standard.

**Page 2; Subclause 2.0; Normative References**

**Comment:**

I would like to see C57.12.25 referenced somewhere in the standard and its status identified as "unmaintained", or otherwise, and that it has been replaced by the C57.12.38 standard. My concern is that some Users and possibly others will reference C57.12.25 without knowing that it is no longer maintained.

**Proposed Change:**

Include in Section 2 (Normative References) on page 2 and include identification of its status as "NOT MAINTAINED" or something equivalent.

**Resolution (Agreed to by Working Group Members): This change will** NOT be made for the following reasons:

1. Since Standard C57.12.25 is not mentioned in the text of the document, it cannot be included as a normative reference.
2. Standard C57.12.25 should have been withdrawn by IEEE when C57.12.38 was published.
3. The “Introduction” on Page iv now has this statement:

In 2009, the first version of this standard was prepared. It replaced and combined ANSI C57.12.21-1992 and ANSI C57.12.25-1990 and was generally revised to comply with the then approved style for published standards.

**Page 20; Clause 10.0; Oil preservation**

**Comment:**

Scope indicates liquid filled transformers and in Clause 10, oil is mentioned.

**Proposed Change:**

Replace “oil” by “liquid.”

**Resolution (Agreed to by Working Group Members):** We will consider changing this to “liquid” once the Task Force on the Terms Normalization White Paper has been submitted or until we have direction from the Sub-Committee. Once either of these occurs we will review this request.

**Page 8**

**Comment:**

I am concerned about the use of the term "Large Interface". I use this term in my company specs and it is generally known in the industry, but I cannot find a formal definition. This may be confusing to the "less experienced users". NOTE: The IEEE entry system prevents me from entering multiple page numbers, etc. but there are two figures that use "Large Interface".

**Proposed Change:**

Referring to fig 1C. "Small interface" = Std 386 Fig 7, and "large interface" = Std 386 Fig 8, 9. Maybe changing the Caption on 1B (for example) to "Figure 1B - Type 1 arrangement large interface (IEEE 386 figures 8 and 9) separable . . . " Using similar Captions for other figures.

**Resolution (Agreed to by Working Group Members):** As with the previous discussion on the “small interface” terminology, this topic will be addressed in the next revision of the standard when more research can be done to determine if the small and large interface terminology is still appropriate.

**Page ii; Keywords**

**Comment:**

The term "padmounted" isn't used in this standard that I can find, so I question why it is referenced in this section.

**Proposed Change:**

Consider deleting "padmounted" from this section.

**Resolution (Agreed to by Working Group Members):** Keywords are words that users might input when they are searching for a document. It does not necessarily have to be found in the document. So “padmounted” will remain as a keyword.

**Figure 6**

**Comment:**

The terms "ADD" and "SUB" should be identified.

**Proposed Change:**

Figure 5, Column Headers "ADD" and "SUB": I propose that "ADD" and "SUB" be defined as additive and subtractive polarities, respectively. Some may not realize what the terms "ADD" and "SUB" stand for as neither polarity or additive / subtractive is mentioned on this page.

**Resolution (Agreed to by Working Group Members):** This change will be made. The column headings will be changed from “ADD” to “ADDITIVE” and “SUB” will be changed to “SUBTRACTIVE.”

**Page 5; Subclause 6.2 (2 Comments Received)**

**Comment on Line 9:**

Since the applied-voltage test is required on the low voltage winding (as called out on line 13 and 14 in this section), the first sentence of this section should be revised. Otherwise, the first sentence could be interpreted to imply that no applied-voltage test is required for either the high or low-voltage windings.

**Proposed Change for Line 9:**

I propose that the first sentence of Section 6.2 (on line 9) be changed to read, "No applied-voltage test is required on the high-voltage winding." Otherwise, the first sentence could be interpreted to imply that no applied-voltage test is required for either the high or low-voltage windings

**Comment on Line 13:**

Change the sentence started with "An applied-voltage..." because there is no applied voltage in this case as defined on line 9 of the same subclause.

**Proposed Change for Line 13:**

Instead of "An applied-voltage...." include "The voltage in the induced-voltage test shall be applied on the low-voltage winding".

**Resolution (Agreed to by Working Group Members):** Both changes will be made.

**Page 22; Annex A, Bibliography**

**Comment:**

If the natural ester fluid guide is cited here (C57.12.147), then the mineral oil guide (C57.106) should also be cited.

**Proposed Change:**

Include in Bibliography as an informative reference:

C57.106 IEEE Guide for Acceptance and Maintenance of Insulating Oil in Equipment.

**Resolution (Agreed to by Working Group Members):** This change will be made.

**Page iv; Introduction (2 Comments Received)**

**Comment 1:**

It would be nice to have a few sentences added in the Introduction summarizing what was changed in this edition of the standard.

**Comment 2:**

While not part of the standard the introduction provides a great opportunity to provide a history of the standard for users, and future working groups revising the standard to understand its development. Since a standard is now active for 10 years, all of those involved in a preliminary revision can be gone before the next revision is made and it is beneficial to have a starting point.

**Resolution (Agreed to by Working Group Members):** This change will be made.

**Figure 4B**

**Comment:**

Table on LV bushing stud sizes lists threads in English unit (inches) but the Note 1 indicates millimeters.

**Proposed Change:**

Indicate that Thread Size is in inches.

**Resolution (Agreed to by Working Group Members):** A line will be added to Note 2 of the Figure explaining that the stud thread sizes are in inches, only.

Ali asked if there was any new business, and none was brought forward.

Ali expressed disappointment that only about half of the working group members voted on the standard, even though an email had been sent reminding the members that the ballot pool was being formed and when the ballot was open. He suggested that the members make sure in IEEE SA that they have set their profile to be notified when there are transformer standards to be balloted.

The meeting was adjourned at 2:45 p.m.

### C57.12.39 – Tank Pressure Coordination – Carlos Gaytan

Carlos presented the following minutes from the working group meeting on March 25, 2014 at 4:45 PM in with 44 in attendance.

The meeting was called to order at 4:45 PM. Introductions were made. The names of the members were projected on the screen. By a show of hands the quorum was reached by having 22 of the 32 members present.

The minutes of the fall 2013 meeting in St. Louis were presented. Ed Smith moved to approve them as written. Ron Stahara seconded. They were approved unanimously.

The comments received from Draft 2.2 were discussed. There were several comments on the proposed change from static to general transient pressure. Steve Shull moved to change general transient pressure to nominal pressure. Alan Wilks seconded. Under discussion, there were several comments about alternative names such as normal operating pressure, or usual service conditions”, as well as using as a reference the standard dictionary for terms. The motion was then voted on and it passed with one negative vote.

Regarding the change from dynamic to rapid transient pressure, there were comments related with identifying a numerical reference for the rates of rise expected on this condition.

Steve Shull made comments regarding the use of single conversion values for the pressure levels covered in the document.

Regarding PRD definition, Josh Herz said that it was worth rewording how the definition of the pressure and flow conditions are written to address devices that have operating pressures other than 10 psig.

On the definition of slotted plug Chris Sullivan asked how would the ½” definition apply to the general case for all standards, since ¼” was utilized quite heavily in the industry, and that we need to modify the wording so it could be used everywhere and not specifically for a given type of equipment.

Another comments was made about the use of the term “negligible”, that should not be used in the document, as it did not have a quantifiable definition.

On comments to Section 5, Steve Shull commented that it was designed for use with round tanks, and square tanks can see different conditions and should also be addressed as different test procedure to be called out inside this document. He suggested that we coordinated with the tank rupture group to get a copy of their recent paper that describes some test methods for rectangular tanks.

Under new business, Carlos mentioned that the next steps were to address these comments in a new draft 2.3, and adding other pending items such as the informative annex addressing coordination between tank strength and pressure relief, as well as vacuum and positive pressure conditions in transformers in operation. This new draft 2.3 is planned to be sent by June 2014 so that the group could have time to review in detail and provide additional comments to new draft before the Fall 2014 meeting

The Meeting was adjourned at 5:50 pm

## Old Business

Steve presented to the subcommittee the need for involvement by the Distribution SC members with the Distribution Bushing TF for modification. Josh Verdell and Ed Smith will be representing the Distribution Transformer Sub-Committee on a Task Force in the Bushing Sub-Committee.

Steve continued by requesting subcommittee member involvement with C57.105 that will be forming a working group chaired by Adam Bromley.

Steve announced that Al Traut has stepped down as chair of the WG for C57.120 and Michael Miller would assume the role of chairman. Again Steve asked for Distribution Transformer Committee individuals to be involved in this group.

## Chairman’s Remarks and Announcements

The following is a recap of comments Steve made to the SC.

Membership is automatically granted to anyone requesting it at the first meeting of a new WG or TF.

Thereafter, membership is granted after a prospective member attends two consecutive meetings as a guest AND actively participates in the work of the TF/WG/SC. A former member may be reinstated if the same criterion is met.

Ongoing membership is maintained by consistent attendance at TF/WG/SC meetings, participation in internal TF/WG/SC surveys, or technical/editorial contribution to the TF/WG/SC’s document or work.

Membership may be revoked if a member fails to attend two consecutive meetings or fails to respond to two consecutive surveys. The chair has discretion in not removing members who cannot attend but are still participating via survey responses and/or other written contributions.

Another key point not mentioned is that each TF/WG/SC Chair (or Secretary) must keep regular logs of attendance and participation and update the roster after each meeting. This is done in our Transformer Committee AM system. This will be used to determine the Quorum requirement for TF/WG/SC meeting business.

The main benefit of membership is the privilege of voting on TF/WG/SC issues.

## New Business

### Eric Davis, secretary of the WG on External Clearances reported on the recent activity to the subcommittee.

The WG and Survey results agreed to use the values contained in NEMA TR1-1980.

The NEMA TR1-1980 lists a single value for each voltage.

C57.12.00-2012, Table 4 lists multiple BILs for each voltage.

This proposed table attempts to merge the NEMA TR1-1980 values with the voltage and BIL.

The WG agreed to increase the Distribution Transformers phase-ground values for 110 and 125 kV BIL by about 10%.

The WG agreed to remove the "Minimum clearance between top shed of insulator of bushings of different phases" since:

\* The early bushings had a stud connection and typically had an inch or more of porcelain between the metal stud and the edge of the bushing shed. This is no longer true with the condenser style bushings.

\* It was also noted that the critical stress on the metal top cap of a bushing is always higher than the shed to shed stress and that no one had ever seen a flashover from porcelain to porcelain.

### Sanjib Som asked how you may comment on a ballot when you cannot attend a WG meeting.

Steve thanked Sanjib for the question and reviewed the SA process to go into MyProject and select the areas of interest so you get notification of ballot pools being formed where you would be able to offer comments to the WG through the ballot mechanism.

### Phil Hopkinson gave a heads up to the SC that a request would be made to the Performance Characteristics SC to work on a task force whose goal would be to address partial discharge that is occurring between the core and inner winding in certain winding configuration. His hope was to add a paragraph to C57.12.00 to address the need for manufacturers to make design compensation to prevent this phenomenon from happening.

## Adjournment

Ron Stahara made a motion and Kent Miller seconded to adjourn the meeting and the SC approve by unanimous acclamation.