# Distribution Subcommittee – Chair: Stephen Shull

**April 14, 2015**

**San Antonio, TX**

**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 34 of the 55 members in attendance by count of those identified on a slide presented in the meeting. Recorded attendance gave 113 in attendance, 42 members and 15 requesting membership.

The agenda was reviewed and motion made by Dan Sauer, seconded by Ron Stahara and approved by unanimous acclamation of the members in attendance.

The Fall 2014 meeting minutes were reviewed and motion made by Sanjib Som, seconded by Dan Sauer and approved by unanimous acclamation of the members in attendance.

## Working Group and Task Force Reports

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

Craig presented the following minutes from the working group meeting on April 13, 2015 at 4:45 p.m. with 33 persons in attendance.

1. Meeting was called to order at 4:45 p.m., April 13
2. Chairman advised WG of the Work Session which took place Friday and Saturday, April 10 – 11, before the General Meeting. Draft 1.0 had been created between the Washington DC and San Antonio meetings based on the work completed in Washington DC. Draft 1.0 had been sent out to the WG members before the work session in San Antonio. Draft 1.1 was created from work done during this past week’s work session.
3. Approval of Washington DC minutes and San Antonio‘s agenda was given.
4. The Chairman reviewed presentation given at the IEC TC14 meeting in Tokyo, Japan last November regarding the work completed in Washington DC.
5. Chairman reviewed Draft 1.1 with Working Group members and Guests
6. Highlights of Draft 1.1
   1. Discussion on Design Type B resulted in establishing a standard range of regulation in the Raise and Lower directions for Forward and Reverse Power Flow. Annex C created for additional information on step-voltage regulator construction.
   2. Temperature limits in Table 2 enhanced to include differences between IEC and IEEE. Updates also made based on latest changes to C57.12.00.
   3. Added corresponding maximum system voltages to rating tables for single and three phase regulators, 50 and 60 Hz.
   4. Increased maximum supplementary continuous-current rating from 668 to 875 amps.
   5. Addressed preferred force-air ratings in a new table.
   6. Provided audible sound levels based on kVA.
   7. Added additional Design Tests; Audible Sound and Tank Integrity.
   8. External dielectric clearance table provided for Distribution and Substation regulators.
   9. Changes to Design Impulse and Temperature tests in C57.12.90 incorporated.
   10. Routine and Design On-Load Tap-Changer tests added
   11. Obsoleted referenced control design tests removed and replaced with latest standards.
   12. Details on Universal Interface (Mil Spec connector) established for juncture between tank and control enclosure. Identification and numbers of terminals were implemented.
   13. Design compatibility test for control and tap-changer groupings.
   14. Annexes added for Step-Voltage Regulator construction, “Bypass off Neutral” issue and Overloading of Voltage Regulators.
7. Work Sessions will continue at the Memphis meeting, October 30 – 31, 2015. An attempt will be made to have a meeting, July or August, in Germany or France with the IEC members and any interested IEEE members before the Memphis meeting.
8. Next IEEE Transformer Committee WG meeting— November 2, 2015 at the Peabody Hotel in Memphis TN.

Close of Meeting: 6:00 p.m., Gael Kennedy recording.

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

Al presented the following minutes from the working group meeting on April 13, 2015 at 11:03 a.m. with 66 in attendance.

Introduction of members and guests was done. Al Traut reviewed the membership requirements and welcomed new members; Rhett Chrysler, Fred Friend, Ben Garcia, Ed Smith and Giuseppe Termini. A quorum of the WG’s members was present.

The proposed agenda was reviewed. A motion was made (Ron Stahara and Steve Shull) to approve the agenda. The motion carried with no dissent.

The minutes of the Fall 2014 Tyson’s Corner meeting were discussed and approved (Ron Stahara and Marty Rave). The motion carried with no dissent.

Al Traut provided the Chair’s Report. The published 2011 revision 10-year cycle ends December 31, 2021. The current PAR expires December 31, 2016. The working group needs to prepare to vote to send the standard to ballot at the Fall 2015 meeting. Al reminded the group that “mineral-oil-immersed” will be replaced with “liquid-immersed” in the Scope of the C57.12.20 document.

The first order of old business was on minimum impedance values. It was noted that the C57.12.20 standard never had impedance requirements in the past. The group discussed whether transformers with secondary voltages greater than 600 Volts should be included in the minimum impedance table. A motion was made (Rhett Chrysler and Ron Stahara) to remove the minimum impedance values for transformers with a secondary voltage greater than 600 Volts from the table. The motion carried with no dissent.

The 3-phase minimum impedance values were discussed next. It was noted that the 3-phase impedance values from the C57.12.34 standard are based on 65kA breaker panels. The current 3-phase minimum impedance values proposed for the C57.12.20 standard are the same as the 1-phase values on a per-phase basis (i.e., the minimum impedance values for a 1-phase, 15kVA and a 3-phase, 45kVA design are the same). A suggestion was made to align the corresponding 1 and 3-phase kVA lines in the table.

Next, the group reviewed the proposed paragraph for Section 4.3 (Minimum Impedance Values). A motion was made (Josh Verdell and Ron Stahara) to change “nameplate impedance” to “nominal impedance”. The motion carried with no dissent.

The next order of old business discussed was platform mounting requirements or recommendations. Josh Verdell provided a presentation showing various types of transformer and regulator bases that can be mounted on platforms. Included in the presentation was a proposed sketch of a base to include in the C57.12.20 standard. Feedback from the group was; a) that more dimensions for the bolt-holes in the proposed sketch are needed to ensure consistency, b) the need to ensure that the bolt-hole provisions are not too close to the tank, c) that consideration needs to be given to cases where radiators or other parts of the equipment could interfere with access to the base bolt-hole provisions. Due to the amount of time expected to finalize any addition of platform mounting requirements or recommendations to the standard, Tom Callsen proposed that the working group wait until a future revision to include. Josh Verdell agreed to issue a survey to users to assess what type of detail should be provided, if any, for platform mounting of transformers.

Under New Business, Al Traut noted that Chuck Simmons will be leaving the group and a new Vice-Chair is needed.

The next meeting will be held November 1–5, 2015 in Memphis, Tennessee.

Meeting was adjourned at 12:07 PM, Chuck Simmons recording.

### C57.12.28, C57.12.29, C57.12.30, C57.12.31, C57.12.32 – Enclosure Integrity – Dan Mulkey

Dan Mulkey presented the following minutes from the working group meeting on April 14, 2015 at 8:00 a.m. in with 56 in attendance.

Dan Mulkey called the meeting to order at 8 a.m. announcing that Bob Olen had retired and he was named the new chair of the working group and Jerry Murphy would be the vice-chair.

Introductions were made and a call for quorum showed 32 of the 37 WG members were in attendance giving quorum. Note that the full attendance list is recorded and available in the Association Management System. Omar Ahmed and Ali Ghafourian were accepted as members. The other two guests requesting membership have not yet met the minimum requirement of attending the last two or two of the last three meetings.

Minutes of the Fall 2014 meeting were reviewed and with minor amendments a motion was made by Ron Stahara to approve as amended and Gael Kennedy seconded. No further discussion was held and the minutes were passed by the majority of members in attendance with no dissenting or abstaining votes.

Dan reviewed the status of the standards group with C57.12.28, 29, 30 & 31 inactive as all have recent publications requiring no action for a while with the earliest expiration dates in 2020.

C57.12.32 IEEE Standard for Submersible Equipment – Enclosure Integrity is active last published in 2003 and reaffirmed in 2008 and due for revision by 2018.

1. Dan commented that these enclosure integrity standards are joint standards originally developed with the IEEE Switchgear Committee (SC) and as such they have commented on each of the recent ballots.
2. One concern from the SC was the discontinuation of the manufacturing of the FS-40 UV lamps used for accelerated weather testing. A suitable substitute is being sought. Some manufacturers have a stockpile and have no immediate concern.
3. Dan offered changes to the abstract for review by the WG to provide with the PAR application.
4. Dan showed a textbox note to the IEEE Editorial to advise the introduction is historically correct with ASC and should remain. The WG had no concerns with this note.
5. Alex Macias, a member of the SC and the TC was in attendance and provided input on various sections via email. Dan Mulkey also received a number of comments via email from the Reclosers and Other Distribution Equipment (RODE) Subcommittee of the Switchgear Committee. The WG started reviewing the comments with anticipation of receiving PAR approval prior to the next meeting.
6. RODE comments included the following:
   1. There was a request to make IEC 60529 a normative reference to this standard. Carlos Gaytan had a copy and showed it to the WG.
   2. The question of “What is submersible?” Needs to be addressed.
      1. C37.74 & C37.60 define depth of submersion differently.
      2. No requirements provide a definition.
      3. Tom Holifield of Howard Industries will find out what they do to determine submersible by test criteria.
      4. Brian Klaponski indicated Carte International performs a 24-hour pressure test.
      5. Alex Macias will ask for RODE SC input.
      6. IEEE 495 Guide for Testing Faulted Circuit Indicators talks about submersibility.
   3. The definition of Enclosure was discussed
      1. Dan showed a proposed definition and reminded the WG that this is what the manufacturer puts around the equipment not what the equipment is installed in.
      2. Brian Klaponski suggested adding the word “contained” and moved for approval with Ali Ghafourian seconded. The motion passed with unanimous approval by those present.
   4. Discussion continued about section 4.1 Enclosure Design Requirements.
      1. Dan presented edits to simplify the section and questioned if it was needed.
      2. Donnie Trivitt moved to just delete the section; Ron Stahara seconded then withdrew the motion after further discussion.
      3. Giuseppe Termini moved to change the title to ***Enclosure Design Requirements Objective***; Ron Stahara seconded and the motion passed unanimously.

Time was expiring and Dan adjourned the meeting at 9:15 a.m., Jerry Murphy recording.

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

Ron presented the following minutes from the working group meeting on April 13, 2015 at 3:15 p.m. with 71 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 Jerry Murphy and seconded by Ali Ghafourian to accept the agenda as shown; the motion passed unanimously. A motion was made by Ed Smith and seconded by Jerry Murphy to accept the minutes of the Fall 2014 meeting as written; the motion passed unanimously.

Ron Stahara covered the ballot pool distribution and the results of the ballot. These results are as follows:

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| **Classification** | **Total** | **Percentage Distribution** |  |  |  | |
| **Consulting** | **32** | **30%** |  | **88** | **Affirmative Votes** | |
| **Distributor/Retailer/Reseller** | **1** | **1%** |  | **4** | **Negative Votes**  **92 votes that count to Ballot** | |
| **General Interest** | **17** | **16%** |  | 2 | Abstentions | |
| **Government - Other** | **3** | **3%** |  | 94 | Total Received | |
| **Insurance/ Risk Management** | **1** | **1%** |  | This translates into a 95%  affirmation vote for the document. | | |
| **Producer - Component** | **21** | **20%** |  |
| **Producer - Other** | **3** | **3%** |  |  | |  |
| **User - Consumer** | **3** | **3%** |  |  | |  |
| **User - Industrial** | **7** | **7%** |  |  | |  |
| **User - Other** | **18** | **17%** |  |  | |  |
| **Total** | **106** |  |  |  | |  |

The Working Group proceeded to discuss a select group of comments for which the ballot resolution group needed direction from the Working Group. After some discussion, a number of responses were developed to these.

A motion was made by Jerry Murphy and seconded by Saidi Hachichi to accept the Working Group developed responses to these comments. This motion passed unanimously. With this, the meeting was adjourned.

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

Jerry reported the working group met Tuesday afternoon at 1:45p.m. with 37 persons in attendance.

Jerry Murphy 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 not reached by having 8 out of the 17 members present. 2 members arrived later to complete quorum, so Gary Hoffman moved to approve the agenda and Steve Shull seconded. Agenda was approved. Ron Stahara made a motion to approve the minutes of the last meeting (Spring 2014). Lee Matthews seconded and the motion was approved.

The group then reviewed the file with the comments from the ballot of draft 4. Gary Hoffman moved to accept the comment related with lack of clarity of section 4.3, Tables 2 and 3. Lee Matthews seconded. After discussion, there was a friendly amendment to the motion by Steve Shull and seconded by Lee Matthews, eliminating first paragraph and sending one sentence to the other paragraph. The motion was approved with one negative vote.

Steve Shull made a motion to reject the comment related with Annex A. Marty Rave seconded and the motion was approved. Regarding the comment of section 3.4, Gary Hoffman made a motion to approve the revision made by Jerry to section 3.4. Carlos Gaytan seconded and the motion was approved. Jerry then reviewed the comment related with standard for monitoring (C57.143). Gary Hoffman moved to reject the comment. Marty Rave seconded and the motion was approved. Then the comment related with the pressure relief device was reviewed. Josh Herz said it was critical to know the original intention of the PRD requirements, and if they were related or not with rupture discs. After some discussion Carlos Gaytan made the motion to table the resolution of the comment based on the work of the WG C57.12.39, and after that to send and electronic ballot to resolve the comment. Chris Sullivan seconded and the motion was approved. On the review of the comment related with 50 and 60 Hz, Steve Shull moved to reject the comment. Gary Hoffman seconded and the motion was approved.

The group then reviewed the comment about temperature range on section 5.9.1 (Sealed tank system). Brain Klaponski made a motion, seconded by Steve Shull, to change the text in the Note of 5.9.1 from “Operation at” to “Operation beyond”. The motion was approved.

At the end of the meeting, Jerry informed that next WG meeting would be in Nov. 1-5, in Memphis, TN. The meeting adjourned at 3:00 P.M., Carlos Gaytan recording.

Jerry stated that he would work with the ballot resolution committee and hopefully perform an electronic ballot with the working group before the fall meeting and the October 23 deadline. Should the working group fail to complete the ballot resolution then a PAR extension would be requested.

### C57.12.37 – Test Data Reporting – Tom Callsen

Tom Callsen reported the working group met Tuesday afternoon at 3:15 p.m.

The Chair called the meeting to order, and introductions were made. Rosters were circulated. A quorum was achieved with 11 of 21 members present. Ron Stahara introduced a motion with a second from Lee Matthews to accept the Fall 2014 meeting minutes as written. The motion passed unanimously.

There was discussion to resolve the negative ballot comments from the recent ballot. The motions to resolve the ballot comments were as follows:

* Alan Wilks introduced a motion with a second from Steve Shull to remove the dates from the standards listed in the normative references. The motion passed unanimously.
* Steve Shull introduced a motion with a second from Lee Matthews to remove the second sentence, “*It is preferred by many PC users.*” from Section 5.3.1. The motion passed unanimously.
* Alan Wilks introduced a motion with a second from Dan Mulkey to relocate all the standards referenced in the normative references to the bibliography. After discussion, Alan Wilks amended the original motion with a second from Dan Mulkey to move all the standards not referenced in the document to the bibliography and leave standards referenced in the document in the normative references. The motion passed unanimously.
* Lee Matthews introduced a motion with a second from Alan Wilks to resolve the issues in Table 1 and Table 2 by having the information in the “Field Length” column reflect the number of characters in the field (ex. 4) and not the field format (ex. 4.2). The motion passed unanimously.
* Steve Shull introduced a motion with a second from Lee Matthews to review a potential revision of ASCII format to XML format in the next revision of the document. The motion passed unanimously.

The Chair indicated since all comments were now resolved, the revised standard will be issued for recirculation along with details of each comments resolution.

There will be a Fall 2015 working group meeting in Memphis, TN, Marty Rave recording.

### C57.12.38 – Single Phase Padmount Transformers – Ali Ghafourian

Ali presented the following minutes from the working group meeting on April 13, 2015 at 1:45 p.m. with 55 in attendance.

Ali Ghafourian opened the working group meeting at 1:45 p.m. A quorum was established. Since Mike Faulkenberry was not able to attend, Alan Wilks volunteered to take the meeting notes.

A motion was made to approve the minutes from the Fall 2014 meeting, it was seconded, and the motion was passed unopposed by the working group members.

Ali presented the status of the 2014 document. A mistake was found after the publication where the note found in Figure 2 was absent. Erin Spiewak is checking to see if the mistake was made before or after the ballot. Either way, the mistake should be corrected. Erin will report back to the chair with information.

Ali said it was time to get started on the next revision of the document and pointed out several items that need to be discussed for the next revision.

1. Some of the Figures are very small and difficult to read.

It was suggested that the parking stand figure should be moved to another page to enable the top, side and front views to be larger and more readable. However, some WG members liked the parking stand drawing as it was and it should remain on the same page as the rest of the drawing.

1. It was suggested that we consider adding dual voltage ratings (DV) as shown in C57.12.20.

There was a lot of discussion on this topic, including the fact that some DV ratings were shown on the old C57.12.25 document. It may become complicated as related to the location of the switch, what voltage should be DV unit be shipped and should other accessories be included, e.g. bayonets, fusing, under-oil arresters, back-up CL fuses, isolation links, liquid level devices, etc.

1. Shall we keep the note that shows the distance between the front plate and the closest sill projection?

No discussion was held on this item.

1. Type I units have always used spades, whereas Type II units have used studs equipped with spades. Should we change Type I secondary bushings to be like Type II secondary bushings.

No discussion was held on this item.

1. Section 12.2 Strength of Tank says the test should be done “without permanent deformation”. It is doubtful that this could be met with zero permanent deformation. How can the tolerance in deformation be defined?

Suggestions were a maximum of one metal thickness deformation. Another suggestion was 1% of the total length of the dimension being measured.

1. There is not a discusssion10.4 Tank Covers. Perhaps we need to define “dishing” due to pressure/temperature changes. Perhaps the reference in C57.12.28 would be enough where it says the cover should not be able to collect and hold water.

Old Business

Small interface – deferred

Changing “oil” to “liquid” – deferred

LV bushing cantilever strength – new TF will handle this

New Business

Mike Miller suggested we look at the ergonomics of pulling elbows when the bushings are at the present 12.5 degree angle. He suggested a larger angle (perhaps 25 degrees) so the operator is pulling at an approximately 40” height when using an 8’ shotgun stick. Mike will study this and report back to the WG at the Memphis meeting.

It was suggested that the IFD become a part of the standard. This was an item that would be considered commercialization and was not in the scope of this WG.

Adding minimum impedance was discussed, since it is also being considered for 12.20 and 12.23.

Giuseppe Termini indicated that he has experienced trouble mating a “large interface” 34.5kV bushing elbow onto the bushing because of the bushing clamp and/or stud interfering with the elbow. This should be discussed and coordinated with IEEE 386.

The meeting adjourned at 3:00 p.m., Alan Wilks recording.

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

Carlos reported the working group met Tuesday afternoon at 4:45 p.m. with 45 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. The agenda was presented. A motion for approval was made by Al Traut, seconded by Alan Wilks. The motion was approved. A motion to approve the minutes of the Fall 2014 meeting was made by Josh Herz, seconded by Alejandro Macias. The motion was approved.

On the chair report, the names of 5 new WG members who requested membership in the Fall 2014 meeting were presented. (Omar Ahmed, Kahveh Atef, Anil Dhawan, Alejandro Macias, Jerry Murphy). Since the PAR expires in Dec. 2016, the chair announced that the agenda for the Fall 2015 meeting would include a motion to approve to take the document to ballot.

Then Draft 3 was reviewed. A proposed wording for PRV liquid emission was presented. The text was modified to include liquid instead of oil. Ron Stahara made a motion, seconded by Ali Ghafourian, to accept the proposed wording as modified. There was discussion regarding the purpose of the PRV location at the 140C level, when C57.91 recommends 120C as the highest top oil temperature. The group agreed that while the original intent of the 140C value is not known, it is considered it was specified in order to ensure that liquid would not be expelled during PRV operation even under severe conditions. The motion was then voted, and it passed.

Then the proposed wording for the PRD flow rate was presented. Carlos proposed to change the units of measure to CFM instead of SCFM. Josh Herz discussed the potential challenges of using CFM instead of SCFM, and the purpose of the addition of specification to measure flow at 1.5 times operating value for the device. CFM is an incomplete definition and can therefore be measured at many different conditions and provide different flow rate measurements at each of those conditions. Where SCFM is an adjusted value to reflect what the flow measured at any condition would be when it is converted back to standard conditions. For the resolution of this subject, a task force was formed to investigate why the change from SCFM to CFM was made by the standard C57.12.10, and also to provide a recommendation for what to use in the C57.12.39 standard. The members of this TF are Josh Herz, Chris Sullivan, and Jerry Allen. A suggestion was made to contact John Rossetti to see if he could recall the purpose behind this change. A recommendation was made to split the proposed language into 2 sentences, one to describe the opening characteristics, and the other to describe the flow rate requirements. The group felt this would be a good change to improve clarity of the requirements.

Then the subject of the inlet port threads was reviewed. Carlos proposed the wording be changed to include UNC instead of NF. A motion was made by Al Traut, seconded by Ron Stahara, to strike the reference to UNC / UNF entirely from the wording in this section. The motion passed.

The other subject reviewed was the proposal to add the use of pressure relief means for submersible transformers as Annex B.3. There was discussion related with the use of the words valve and device on this section, since the PRDs were not used nor recommended for submersible transformers, and that in reality the term device was related to a plug that is removed for a manual pressure relief operation. The group agreed to add the term pressure relief plug, include it in the definitions of this standard, and with the modifications made, a motion was made by Ron Stahara and seconded by Al Traut to add the wording to the standard as part of Annex B.3. The motion passed.

Carlos informed that next WG meeting would be in Nov. 1-5, 2015, in Memphis, TN. A motion for adjournment was made by Ron Stahara and seconded by Al Traut. The meeting adjourned at 5:50 P.M., Justin Pezzin recording.

## Old Business

* None

## New Business

* None

## Chairman’s Closing Remarks and Announcements

Steve had no closing comments to the SC except to see them in Memphis in the fall.

## Adjournment

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