

Annex C Distribution Subcommittee – Chair: Stephen Shull

October 22, 2014

Washington DC Metro Area

Chair: Stephen Shull

Vice-Chair: Jerry Murphy

C.1 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 37 of the 53 members in attendance.

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

The Spring 2014 meeting minutes were reviewed and motion made by Gael Kennedy, seconded by Ed Smith and approved by unanimous acclamation of the members in attendance.

C.2 Working Group and Task Force Reports

C.2.1 C57.12.36 – Distribution Substation Transformers – Jerry Murphy

Jerry reported the working group did not meet as C57.12.36 is currently open for ballot and will close on November 5.

Jerry stated that he would be forming a ballot resolution committee and already had one agreeable volunteer with Gary Hoffman. Any comments requiring the attention of the working group will be transmitted by email and reviewed at the next meeting in San Antonio next April.

C.2.2 C57.15/IEC 60076-21 – Step-Voltage Regulators – Craig Colopy

Craig presented the following minutes from the working group meeting on October 20, 2014 at 4:45 PM with 44 persons in attendance.

Craig opened the meeting by welcoming everyone. Craig asked the attendees to introduce themselves.

IEEE PAR approved March 27, 2014; WG C57.15/ 60076-21 established. Expires Dec 31, 2018

IEC 60076-21-RR (Review Report) issued in August 2014 to the IEC Community. WG MT60076-21 established.

CD (Committee Draft) scheduled for November 2015

CDV (Committee Draft Vote) scheduled for August 2016

FDIS (Final Draft International Standard) scheduled for August 2017

IS (International Standard) scheduled for February 2018

Scope of project: This standard describes electrical, mechanical and test requirements of liquid-filled, single- and three-phase, 50 and 60 Hz, self and forced-air cooled distribution overhead

and substation step-voltage regulators, 1000 kVA (single-phase units) or 3000 kVA (three-phase units) and smaller, 34,500 Volts and below (2400 Volts minimum) and their associated controls.

Working group started out with a day and half work session taking place Friday and Saturday before the General IEEE Transformer Committee meeting. Eight members took part in this opportunity. A summary of the work was provided on Monday afternoon to the rest of the members and guests.

Key areas discussed during the meetings were as follows:

- Differences between Voltage Regulation ranges of Type A and Type B designs during Forward and Reverse Power Flow situations.
- Differences in Temperature rise requirements between C57.15/ 60076-21 and IEC 60076-2 temperature standard
- Differences in Voltage ratings specified in tables from C57.15/ 60076-21 vs IEC General requirement standards. Addition of Highest System Voltage column being considered along with the nominal voltage rating.
- Consideration of raising ADD AMP Max. continuous current rating
 - 668 to 875 amps
- Regulator mounting configurations

Match work being done for C57.12.20 (Overhead transformers)

- Pole and Platform mounting
- Preferred Forced Air ratings
 - 333 kVA and higher
- Short Circuit withstand considerations
 - Removal of 40 times rated option.
 - Maximum withstands matched up with published LTC maximums per rated voltage applications
 - Note covering flexibility regarding distribution ratings versus substation ratings with regard to required Asymmetrical Peak value. leaving the 25 times as the standard symmetrical rating while maintaining a 2.6 factor for the asymmetrical 1st peak for substation ratings.
- Audible sound levels per power ratings and test procedures
 - NEMA Sound Level table
 - C57.12.90 and IEC 60076-10 references
- Tank Rupture Design test
 - Consider procedure from C57.12.20

- Match up with typical fuse or breaker protection for Line and Substation applications.
- Consider Partial Discharge Test
 - 25 kV class and higher
 - Routine and Design test or just Design
- External Dielectric Clearances
 - Fold in work being done by TF
- Tap changer routine and design tests
 - IEC 60214-1reference
- Universal interface between control enclosure and apparatus
 - MIL Spec cable connections to be considered
 - Standard Pin use for specific parts of circuitry
 - IEC and IEEE acceptance
- Revision of required IEC Control Design Test standards based on latest recommendations from IEC TC 95 (Measuring relays and protection equipment). Previous standards recommended have been obsoleted
- Annexes covering “Bypass off Neutral implications” DG and Capacitor coordination, and Overload.
- Meeting is planned for San Antonio with a similar additional two day session (Friday and Saturday beforehand.
- Meeting in Europe, IEEE Web Conference meeting or in coordination with scheduled Joint Technical Committee Meeting (JTCM) meetings will be considered for January or February.

Close of Meeting: 18:05 on Monday, October 21

C.2.3 C57.12.20 – Overhead Distribution Transformers – Chuck Simmons

Chuck presented the following minutes from the working group meeting on October 20, 2014 at 11:00 AM with 53 in attendance.

Chuck Simmons asked for the introduction of members and guests.

A quorum of the WG’s members was present (24 out of 33 members were present). Al welcomed new member Rich Smith.

The minutes of the Spring 2014 Savannah meeting were discussed and approved.

Al Traut provided the Chair’s Report. The current PAR expires December 31, 2016. The 10-year cycle ends December 31, 2021. The working group needs to vote to send the standard to ballot by Fall of 2015.

Al Traut noted 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. Al Traut reviewed his proposal for a new section 4.3 on minimum impedance values for secondary voltage ratings 600 Volts and below. His calculations were based on determining the maximum thru-fault current for various kVAs and voltage combinations. Steve Shull suggested that a note similar to note (a) of Table 2 in the IEEE C57.12.34 standard be considered for this section to encourage Users to evaluate all requirements of their system before requiring any recommended minimum impedance values. Since all of the proposed impedance values were the same for the different secondary voltage ratings of each kVA size, a suggestion was made that there be just one minimum impedance value for each kVA size based on the secondary voltage being 600 Volts or less. Many in the group felt that minimum impedance values should also be included for step-down transformers that have a secondary voltage greater than 600 Volts. Rhett Chrysler volunteered to put together proposed language on minimum impedance values for transformers with secondary voltages greater than 600 Volts.

The next order of old business discussed was on transformer mounting methods. Dan Mulkey reviewed his company’s method of direct attachment of single transformers to a pole. Chuck Simmons reviewed his company’s method of mounting transformers on a platform. The general feeling of the group is that something needs to be added to the standard for mounting transformers on platforms. Interchangeability between the bases of different manufacturers was deemed as being important for users. Josh Verdell and Chuck Simmons volunteered to put together a proposal on platform mounting considerations. After a short discussion, no one felt a need for the addition of a weight limit to the standard to indicate when a transformer shouldn’t be attached to a pole, but instead be placed on a platform.

The last order of old business discussed was on the low voltage grounding connection. Currently, only single primary bushing transformers with a secondary voltage of 120/240 Volts are required to have a grounding connection to a tank ground pad. Chuck Simmons reviewed his proposed addition to section 7.5.4.3 wherein information was included on which bushing(s) should have the grounding connection or the ability to have the grounding connection. After discussion, the proposed addition was revised to the following: “The grounding connection shall be connected to the X2 bushing on transformers with a low-voltage rating of 120/240 Volts.” A motion was made (Alan Wilks and Steve Shull) to add this sentence to section 7.5.4.3. The motion carried with 24 approving and 0 dis-approving. There was discussion on possibly clarifying section 7.5.4.3 to indicate that the requirement is only for 1-phase distribution transformers that have a secondary rating of 120/240 Volts.

Steve Shull advised that he will be the Chair for a new Task Force on distribution transformer bushings. Ed Smith will be the Vice Chair for this new group.

No new business was brought up during the meeting.

The next meeting will be held April 12–16, 2015 in San Antonio, Texas. The following meeting will be held November 1-5, 2015 in Memphis, Tennessee.

Meeting was adjourned at 12:14 PM.

C.2.4 C57.12.34 – Three Phase Padmount Transformers – Ron Stahara

Ron presented the following minutes from the working group meeting on October 20, 2014 at 3:15 PM with 53 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 Justin Pezzin and seconded by Jerry Murphy to accept the minutes of the Spring 2014 meeting as written as well as the agenda for this meeting. The motion was passed unanimously.

The first item of business was to discuss the email survey. It was pointed out by Steve Shull that only 36% of the membership responded to the questionnaire concerning the location of the H0 bushing. He stated that to do business we must have responses from the Working Group. Ron stated that of those that responded, there was an 82% favorable response to the locations that were proposed. The Working Group covered the various designs and after some discussion, a motion was made to select the lower position as the preferred location by Gary King which was seconded by Jerry Murphy. This motion passed unanimously.

As we continued to discuss the drawings, Dwight Parkinson and Gary King pointed out that some of the drawings appeared to be mismatched in the document. After some review it was determine that these should be reviewed to verify the correct placement in the document. Steve Shull apologized for the mismatching in the document and committed to this review and correct these as they had been in the past drafts.

This led to a discussion of the application of the dimensions of the live front bushing and dead front interfaces. Alan Wilks brought out that the dead-front dimensions were based on center points of the interfaces since the interfaces measurements are specified in IEEE 386. However, the bushing dimensions are not so well defined. Therefore to provide for proper clearance, the dimension should be from the edge of the bushing. After some discussion, a motion was made by Dwight Parkinson and seconded by Gary King that stated that the dimension of the live front H0 bushing be measured from the edge of the bushing and these dimensions would be coordinated with the other live front specifications in the document. It was pointed out that this would require that the tables be modified in some way to accommodate the new dimensions. This was noted by the Chair. This passed unanimously.

As these tables were reviewed, a question was raised to why bails should be included in some of the tables. This discussion resulted in motion from Gary King to remove the bail comments and eliminate the “With Bail” line in any applicable tables. It was seconded by Carlos Gaytan. After a lot of discussion, it was not resolved as to the reason for bail use. The vote was taken and the motion was defeated with a 4 for and 21 opposed. However, this item was tabled to a future Task Force investigation.

The Chair indicated he would like to move this document to ballot and would like direction from the Working Group. A motion was made by Gail Kennedy and seconded by Cory Morgan to move this document to ballot with the corrections and changes that were covered under the previous motions as well as the editorial changes that were pointed out during the meeting. This was passed unanimously.

With this, the meeting was adjourned.

C.2.5 C57.12.28, C57.12.29, C57.12.30, C57.12.31, C57.12.32 – Enclosure Integrity – Dan Mulkey

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

- Published 9/20/2010, Revision Due: Sep 2020
- Was not discussed.

Bob presented the following minutes from the working group meeting on October 21, 2014 at 8:00 AM in with 50 in attendance.

- Quorum was established
- Dan Mulkey chaired as Bob Olen was not in attendance, and Ali Ghafourian acted as secretary.
- Ron Stahara motioned and Jerry Murphy seconded to approve the minutes of the previous meeting on April 25, 2013 in Savannah, Georgia. The motion was approved unanimously.

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

- Published September 20, 2010
- Corrigenda approved May 16, 2014 to correct error in 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.

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

- Published July 15, 2014

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

- Published August 8, 2014

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

- Discussed changes to the Scope:
 - Discussed difference between “enclosure” and “transformer tank” in terms of subsurface equipment as this type of equipment is installed in a separate enclosure. Based on the definition of enclosure in the present standard it was agreed to use the word “enclosure” as it was.
 - Motion by Jerry Murphy, seconded by Steve Shull: changed from “not accessible to public” to “typically not accessible to public”. Motion approved unanimously
 - Reviewed the list of equipment.

- Motion by Giuseppe Termini and seconded by Gale Kennedy to add “submersible vacuum interrupter” to the list. Motion failed.
- Motion by Giuseppe Termini and seconded by Mike Faulkenberry to add “h) submersible control box” to the list. Motion passed unanimously.
- Motion by Jerry Murphy and second by Brian Klaponski to remove “in excess of 600 volts” changing the line to “These enclosures contain energized electrical apparatus typically not acceptable to the general public, including but not limited to:”, motion passed unanimously.
- Motion by Al Traut and second by Ron Stahara to delete “carbon steel and copper bearing steel” from the scope. Motion passed unanimously.

Revised Scope reads:

Scope

This standard covers conformance tests and requirements for the integrity of submersible electrical equipment intended for installation in submerged or partially submerged environments. These enclosures contain energized electrical apparatus, typically not accessible to the general public, including but not limited to the following types of equipment:

- a) Submersible distribution transformers
- b) Submersible network transformers
- c) Submersible network protectors
- d) Submersible switchgear
- e) Submersible capacitors or inductors
- f) Submersible junction enclosures
- g) Submersible metering equipment
- h) Submersible control box

- Discussed changes to the Purpose
- Motion by Jerry Murphy and second by Gary King to add “enclosure” so that the purpose reads: “The purpose of this standard is to describe the requirements for a comprehensive enclosure integrity system for submersible equipment providing long field life with minimum maintenance.” Motion passed unanimously.

Revised Purpose reads:

Purpose

The purpose of this standard is to describe the requirements for a comprehensive enclosure integrity system for submersible equipment providing long field life with minimum maintenance.

- Title remains unchanged: “IEEE Standard for Submersible Equipment—Enclosure Integrity”
- WG leadership will apply for a PAR with the current Title, and the revised Scope & Purpose

- 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 April 2015 in San Antonio, Texas.

C.2.6 C57.12.37 – Test Data Reporting – Tom Callsen

Steve introduced Tom Callsen as the new chair with Marty Rave as the vice-chair with John Crotty not able to attend for the time being.

Tom presented the following minutes from the working group meeting on October 21, 2014 at 3:20 PM with 20 in attendance. The new chair, Thomas Callsen, replaces John Crotty who has left the industry. Martin Rave of ComEd has volunteered to become the new Vice-Chair.

The WG did not have a quorum – only five of the nineteen members were present. Several missing member were known to be at the hotel, however many were in the Core Gassing and Grounding TF session that ran concurrently.

At the Spring 2014 meeting, the Distribution SC gave approval to go to ballot, however no steps had been taken on C57.12.37 since that time. The new Chair has begun the balloting process. Members of SA should see the ballot pool opening soon.

The Chair will be tracking down the latest draft of C57.12.37 and emailing it to the meeting attendees.

While the lack of a quorum did not adversely affect the progress of C57.12.37, the new Chair will be cleaning up the roster – reaching out to WG members who have not attended a session in the past few years.

C.2.7 C57.12.38 – Single Phase Padmount Transformers – Mike Faulkenberry

Mike presented the following minutes from the working group meeting on October 20, 2014 at 1:45 PM in with 52 in attendance.

Ali Ghafourian opened the working group meeting at 1:45 p.m. Twenty-seven 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 to approve the minutes from the spring 2014 meeting, it was seconded, and the motion was passed unopposed by the working group members.

Ali presented the status of the document, that being that it was published on August 21, 2014. Ali presented award certificates and plaques to those individuals who had chaired task groups during the effort or otherwise had contributed additional effort in getting the document published.

So since the document is now published, Ali asked what we should do next. As part of that, he asked Mike Faulkenberry to lead a discussion on the items remaining open that were either tabled or discussed and considered during the revision process but that we were not able to resolve and incorporate into the document. Also shown were ballot comments that were resolved by agreeing to look at them in the next revision. Those items were:

- The "small interface" terminology is no longer found in IEEE 386-2006. IEEE 386 is currently being revised and is scheduled for publication in 2015. This will be researched for the next PAR and the correct terminology incorporated into the document at that time.
- The working group will not object to considering a change to "liquid" but would like to wait until the Task Force on the Terms Normalization White Paper has been submitted or when we receive direction from the Sub-Committee.
- The document has not been revised to include verbiage to address concerns about the tank pressure requirements that contributed to the formation of the task group, and now working group, C57.12.39. It will be revised with the next PAR after the C57.12.39 working group completes their work.
- Still to be resolved is how to address low voltage bushing cantilever strength requirements.

Steve Shull mentioned that the transformer bushing task force may be able to address the bushing cantilever strength issue, and he would like the groups input on that.

Giuseppe Termini suggested that we address how to include a means for allowing temporary termination of cables in the transformer while keeping them enclosed.

Ali asked if there was any new business, and Josh Verdell suggested we needed to make sure the phase to ground clearance required for units with 125 kV BIL needs to be consistent between the padmounted transformer standard and what is stated in C57.12.00. There is a quarter inch difference between the requirements of the two documents. Steve Shull cautioned that when looking at that issue, you need to clarify whether or not it is metal to metal or something else. Ron Stahara suggested that C57.12.00 and C57.12.90 maybe should state these requirements and be referenced by the individual standards. Steve Shull stated that this might be difficult to reference back and forth between documents and that often the revision dates are different and good present a problem.

No further new business or old business was brought forward. The meeting was adjourned at 2:10 p.m.

C.2.8 C57.12.39 – Tank Pressure Coordination – Carlos Gaytan

The meeting was called to order at 4:45 PM. After the introductions, the names of the members were projected on the screen. By a show of hands the quorum was reached by having 21 of the 32 members present.

The minutes of the spring 2014 meeting in Savannah were presented. Ron Stahara moved to approve them as written. Chuck Simmons seconded. They were approved unanimously.

The report on the tasks from the previous meeting was presented, which were added to draft 2.3; among the changes, the source of the numerical reference for Rapid Transient Pressure definition, making reference to technical papers on the subject.

The proposal for the Informative Annex B was presented, which is intended to provide background to support how the present pressure values for tank integrity and pressure relief means operation were defined. During this review, a document part of the ASME Boiler and Pressure Vessel Code was reviewed; it provided definitions for the pressure relief valve or device, as well as definitions and specifications for concepts such as maximum allowable working pressure (MAWP) and allowable overpressure; these definitions were consistent with the current requirements for these parameters in the standards. A motion was made by Steve Shull to accept the addition of Annex B to the document. It was seconded by Ron Stahara; the motion was approved unanimously.

Then a proposal for providing a quantifiable definition for the term “negligible”, related to the amount of liquid that the pressure relief valve is allowed to emit during operation. There was a lot of discussion about concerns on this proposal, with several good comments providing ideas on how to approach this definition in a different manner in the standard. Notes of the comments were taken and the agreement was to analyze them and provide an alternative wording to be included for draft 3 of the document.

Other open items were reviewed; among them, to coordinate flow rate requirements by transformer size; proposals to address them will be incorporated on draft 3. This draft 3 will be sent to the group before Nov. 30th, requesting comments by Feb. 15th 2015; this is in order to be able to prepare and send a draft 4 of the document prior to the spring 2015 meeting.

No other new business was proposed. A motion to adjourn was made by Steve Shull, seconded by Ron Stahara. The motion was approved and the meeting was adjourned at 5:40 pm.

- * Phil had a comment regarding solar farm transformer applications and how they expand and contract significantly. Phil questioned if this was being considered in this standard. Carlos responded that he would welcome any input that would fall under the working group scope.

C.3 Old Business

- Steve presented to the subcommittee the beginning of a new task force on distribution bushing transformers. A meeting will be held in San Antonio.
- Phil Hopkinson presented an update on the issue of core gassing and how it affects not just wind farm transformers, but all wound core transformers. He is intending to have this incorporated into C57.12.00 and C57.12.90.
 - Jim Harlow commented that the change is today hydrogen is measured and in the past 20 to 30 years ago it was not and when a transformer failed it was just replaced without understanding.
 - Phil Hopkinson responded that it might be true, but he is concerned that construction materials and methods are not what they were and there needs to be a change to make sure this issue is not allowed to go without further investigation and testing.

C.4 New Business

- Ron Stahara made a motion to the subcommittee to take PC57.12.34 to ballot and Gael Kennedy seconded the motion. No discussion was made and the motion carried with unanimous consent and no negatives.

C.5 Chairman's Closing Remarks and Announcements

No comments were made.

C.6 Adjournment

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