10.2 Distribution Transformer Subcommittee Report

Ken S. Hanus - Chairman
ken.hanus@ieee.org

The Distribution Transformer Subcommittee has a total of 9 active working groups/task forces, 4 of those met in Porto.

Subcommittee Meeting Wednesday October 8, 2008 at 10:30 AM
12 Members
10 Guests
22 Total
2 Requests for membership

10.2.1 Chair's Remarks & Announcements:

Review of Administrative Committee meeting highlights

- Future Meetings
- The Unapproved Charlotte minutes were approved with no corrections
- Al Traut and Don Duckett are the new co-chairs of C57.12.33, Loss Evaluation Guide

10.2.2 Working Group Reports

10.2.2.1 C57.12.20 Overhead Distribution Transformers

Alan Wilks & Tommy Cooper Co Chairs
awilks@ermco-eci.com & Tommy.cooper@faypwc.com
PAR Status: Approved 9/15/2006
PAR Expiration Date: 12/31/2010, Current Standard Date: 2005
Current Draft Being Worked On: D1

Did not meet in Porto

10.2.2.2 C57.12.38 Single-Phase Padmounted Distribution Transformers Combined C57.12.25 & C57.12.21

Ali Ghafourian & Mike Faulkenberry Co Chairs
aghafourian@ermco-eci.com & mdfaulke@southernco.com
PAR Status: Approved 12/08/1998 (For combining Standards C57.12.25 & C57.12.21)
PAR expiration Date: 12-31-2009
Current Standard Date: 1995
Current Draft Being Worked on: D6.2, Dated: January 2008

Did not meet in Porto

10.2.2.3 C57.12.28, C57.12.29, C57.12.31 & C57.12.32 Cabinet integrity Standards

Bob Olen & Dan Mulkey Co Chairs
bolen@cooperpower.com & dhm3@pge.com

Did not meet in Porto

10.2.2.4 C57.12.33 Loss Evaluation Guide for Distribution Transformers
Don Duckett & Al Traut Co Chairs
n9mn@cfl.rr.com & atraut@ieee.org
PAR Status: New PAR to be submitted
PAR expiration Date: N/A
Current Draft Being Worked On: D9 April 2003

Attendance: 31 Total
5 Requesting membership
26 Guests

The meeting was called to order at 10:30 am on Tuesday October 7, 2008, in the Corgo Room at the Porto Palacio Hotel in Porto, Portugal. This is a new working group so there were no minutes from previous meetings to approve. A request was made for disclosure of any patents that may be related to the work of the WG, and there were no responses to the request for disclosure.

Chair briefly gave an update on the status of the document. The document was previously developed but never got approved or published. After many requests the decision was made to reactivate the WG and complete the work. Even though the DOE has come out with minimum efficiency requirements there will continue to be multiple designs a user may need to do a total owning cost (TOC) evaluation, based on his/her particulars. Chair stated this is to be a guide and it was suggested wording be added to indicate another purpose of this document is to provide education on the methodology of TOC.

The meeting next focused on the Scope and Purpose of the draft. It was decided to move the second paragraph of the Purpose to the Introduction and add wording to the third sentence "and allow the user to evaluate multiple designs…..".

The WG discussed the limits in 1.2.2 on kVA and voltage ranges and a motion was made and passed to make the high voltage limit 69 kV and below, low voltage limit 34,500 volts and below, single phase 6667 kVA and below, three phase 10,000 kVA and below and cover both liquid and dry type units. This will make the document cover the voltage and kVA ranges of all the distribution transformer documents.

A motion was made and passed to delete 1.2.1 because it really was stating what the purpose was and not the scope, therefore 1.2.2 becomes 1.2.1.

In new business Mahesh Sampat brought up the idea of providing a method to factor in carbon emissions. Below is what Mahesh submitted to the WG. After much discussion it was decided this would be an agenda item at the next meeting.

Treatment of Cost of Emission in the Calculation of Loss Evaluation (A/B) Factors

Submitted by

Mahesh P. Sampat

Cost of Emissions:

Almost all published literature on this subject has not even mentioned much less develop methodology to calculate *Cost of Emissions* in the Transformer loss evaluation equation. In today's environmentally conscious and sensitive world, it would remiss us if we did not address this topic.

The *Cost of Emissions* can be described in both economic and social terms. All power generation activities using fossil fuel emit Greenhouse gases along with other pollutants such as SO2, NOx, Mercury and Particulates. Even non emitting generation method such as nuclear has *Spent Fuel* disposal costs. Societal costs of pollution (effect on health, life span, climate change etc.) are much more difficult to quantify in economic terms and hence are ignored here (Unfortunately).

Treatment of Economic Value:

Most of above mentioned pollutants require permit to emit. Many have *Cap and Trade* systems. In these systems; user emitting more than permitted amount needs to buy *allowances* from another user who emits less than his allocated allowance, thus creating market values for these allowance units. For SO2, NOx & Mercury there is an active trading market. In some western countries (Europe) CO2 allowance has a monetary value. It is very likely that US will have some kind of *Carbon Regulation*, either as direct *Tax on Carbon* or more likely some form of *Cap and Trade* system for CO2.

The best way to treat these emission costs are to calculate effect of these as part of Energy Production cost and add to Energy Costs (EC), rather than develop another factor (such as C) for it.

All generating facilities have to know amount of pollutants they are emitting as a part of compliance requirements. They also know amount of electricity they produced (kwhr). Thus it is easy to arrive at Tons/kwhr of pollutants. Each pollutant allowance has *Current* market value such as for SO2 it is around $700/ton while for NOx it is around $2000-$3000/ton depending on vintage. For Mercury it is $40,000/ton. Thus depending on type and amount of emission the plant has $/kwhr Cost of Emission. This *current* value can directly be added to Energy cost (EC).

The author recognizes that economic value of Emission is very much dependent on Regulatory and Political climate; resulting in a wild fluctuations from time to time, making future projections (needed for TOC Calculations) somewhat challenging.

Another item brought up for discussion was the idea of "Band of Equivalence" (BOE) and should a methodology of how to use it be added. It was discussed either it can be used or the time over which the evaluation is made can be shortened. The item will be discussed at the next meeting and it was suggested the guide could contain some sample calculations to illustrate and educate the user on the effects of BOE.

Another new item of business was how to evaluate wind farm transformers. It was noted that when the wind does not blow the transformer losses now are supported from the grid and the cost to sell power vs. the cost to buy power may differ. It will also be discussed at the next meeting.

Lastly it was brought up the current draft is not in the latest document style and will require bringing up to the most current requirements of style, organization and reference requirements. This will be worked on before the next meeting.

The WG adjourned at 11:29 and will need a meeting slot in Miami.

10.2.2.5 C57.12.34 Three-Phase Padmounted Distribution Transformers
Ron Stahara & Steve Shull Co Chairs
rjstahara@msn.com & sshull@empiredistrict.com
PAR Status: Approved 3/20/2005
PAR expiration Date: 12-31-2009
Current Standard Date: Published March 8, 2005 (2004 date on document)
Current Draft Being Worked On: D4A March 2008

Did not meet in Porto

10.2.2.6 C57.12.35 Bar Coding For Distribution Transformers
Lee Matthews & Giuseppe Termini Co Chairs
lmatthews@howard-ind.com & Giuesseppe.termini@peco-energy.com
PAR Status: No current PAR
Current Standard Date: 2007
Current Draft Being Worked On: N/A

Attendance: 7 Total
4 Members
3 Guests

The meeting was called to order at 2:45 PM on Monday October 6, 2008, in the Tamega Room at the Porto Palacio Hotel in Porto, Portugal. The WG did not meet in Charlotte so no minutes were required to be approved. A request was made for disclosure of any patents that may be related to the work of the WG, and there were no responses to the request for disclosure.

The chair brought to the working groups attention the last revision of the document focused on adding Step Voltage regulators to the document.

The chair asked if any users were requiring bar coding to be put on their transformers. There was some response with those responding requiring some level of bar coding but each had there own requirements.

There was discussion as to how the DOE ruling on transformer efficiency may affect the document. It was brought to the groups attention the DOE had not addressed any labeling requirements. For now the group decided to wait and see what labeling requirements the DOE may develop along with what requirements users may develop as to record keeping and labeling requirements for units meeting efficiency requirements by the DOE.

Chair asked if there was any other new business or proposed changes to the current version and none were brought up.

It was decided no meeting in Miami was required.

Meeting was adjourned at 3:02 PM

10.2.2.7 C57.12.36 Distribution Substation Transformers
Both Positions Open
PAR Status: PAR Approved June 2002
PAR expiration Date: December 2008
Current Standard Date: Approved at September 07 REVCOM

The WG did not meet in Porto

10.2.2.8 C57.15 Step-Voltage Regulators
Craig Colopy & Gael Kennedy Co Chairs
ccolopy@cooperpower.com & grkennedy@nppd.com
PAR Status: APPROVED Date: June 9, 2005
PAR Expiration Date: December 31, 2009
Current Standard Date: C57.15 – 1999 – Published April 2000
Current Draft Being Worked On: Draft 8.4, September 2008
Meeting Date: October 7, 2008, 2:45 pm
Attendance: 15 Total
12 Members
3 Guests

Introduction of all present were made and the Attendance Sheets were passed around.

Minutes of the last meeting on 18 March 2008 in Charlotte were approved.

IEEE Patent Policy was presented to group and no responses or comments were raised.

Much work has been accomplished since the last meeting in March. Comments from the working group on Draft 8.0 were incorporated for the development of Drafts 8.1 and 8.2. Further work in

the areas of Short Circuit withstand, Control type testing and characteristics of the pressure relief device were incorporated in Drafts 8.3 and 8.4. These latest changes were discussed and verbal approval was provided by the members present.

Key changes with regard to Short Circuit withstand was the addition of an asymmetrical 2.6 times factor for regulators rated 165 kVA and higher. Maximum symmetrical short circuit withstand was lowered from 20,000 to 16,000 amps.

IEC Control type tests series 61000-4 were replaced by available series 60255-22 for the purpose of establishing the test level of severity of each of the types of testing.

Characteristics of the pressure relief device has been set at 5 PSI with a flow rate of 50 SCFM. A comment template was sent out to the working group in conjunction with Draft 8.4 being placed out on the Distribution Transformer SC website. Comments are being asked for from the working group on Draft 8.4 by November 14, 2008

Work has also been done behind the scenes preparing the document for acceptability by IEC and IEEE for Dual Logo. Input on the use of reference standards from IEEE and IEC has been provided by IEEE and IEC editorial staffs. Latest Draft 8.4 has been submitted to Phil Hopkinson, chairman of the IEC TC-14 Advisory Group for technical review. Discussion on this latest Draft has been placed on the agenda for the IEC TC-14 plenary meeting taking place in Sao Paulo, Brazil, November 19.

Comments from the PC57.15 working group, the IEC TC-14 Advisory Group and the IEC TC14 Brazil meeting will be provided for review along with a revised Draft 8.5, if necessary.
Plan is to submit the latest draft through the ballot process in the first quarter of 2009.

Motion was made to adjourn and passed with no objection. Meeting was over at 3:30PM

10.2.2.9 C57.12.37 Electronic Reporting of Test Data
Richard Hollingsworth & Thomas Callsen Co Chairs
rhollin@howard-ind.com & Thomas.Callsen@ExelonCorp.com
PAR Status: Need to submit PAR for next revision
PAR Expiration Date: N/A
Current Standard Date: July 2005
Current Draft Being Worked On: N/A

Did not meet in Porto

10.2.2.10 Task Force on Loss Evaluation & DOE Efficiency
Phil Hopkinson Chair, Secretary: Scott Choinski
phopkinson@ieee.org
Attendance: 37 Total

Mr. Hopkinson reviewed slides from his presentation titled "Distribution Transformer Energy Efficiency Task Force." The presentation is posted on the IEEE Transformer Committee Website under the Distribution Transformers Subcommittee.

The first point brought up was the ruling goes in effect for units manufactured on or after January 1, 2010. It does not cover units manufactured before that date but sold after the date.

Mr. Hopkinson reviewed changes made in the efficiency tables with respect to the discrepancies between corresponding three phase and single phase sizes such as a 75 kVA single phase and 225 kVA three phase.

Mr. Hopkinson also reviewed the various efficiency levels that were considered and how they were developed and where the final ruling landed.

There was also discussion about the factors used in the DOE's analysis for rises in the cost of materials and energy and how that may or may not have been accurate.

DOE does not have an enforcement program and is relying on the Honor System and Whistleblowers to find violators. Fines for violations are steep.

It was discussed there are two issues which need clarification from the DOE. One is on Dual Voltage transformers and at which voltage rating will efficiencies need to be met. Currently the final rule indicates efficiency measured on highest loss connection. This has been appealed to DOE for resolution.

The other issue is on units with secondary coils that can be connected either in parallel or series. Typically these are used most of the time in a series configuration but the parallel configuration is the more stringent connection. This also has been appealed to DOE for clarification and hopefully they will rule efficiencies are based on the connection a unit is shipped with.

Bottom line efficiencies are high and any slight change in efficiency equates to large differences in cost.

New Business

The TF also discussed the fact DOE did not address labeling or documentation of units meeting efficiency requirements. Some utilities are requesting units before the January 1, 2010 meet the new ruling and the problem is how do you label a unit to show it meets the new ruling or how do you document on test reports a unit meets the requirements. After much discussion it was to decided to bring this issue up to the subcommittee for resolution.

The meeting adjourned at 1:05 PM.

10.2.3 Subcommittee Old Business:

Marcel Fortin asked about the status of his concerns in C57.12.20. He had filed an appeal on a motion by the WG relating to tank withstand requirements. The appeal has not been responded to by the SC chair and will be done in a timely manner.

10.2.4 Subcommittee New Business:

The issue of how to label and document distribution transformers meet the new DOE efficiency rules was discussed. DOE does not have any rules whether a unit shall be labeled or not and if so what the labeling requirements are. They also do not have any requirements on documentation of meeting DOE requirements. All agreed there needs to be a standard on how to label and document a unit meets DOE requirements. Two motions were made and past. The first motion was:

To confirm compliance to the new DOE regulations for distribution transformers, each distribution transformer that is compliant to the new DOE regulation shall have:
1) a nameplate with the following notation: "DOE Compliant 2010"
2) a 50 mm (2 inch) round green decal applied to the outside of each transformer tank. The specific green color of the decal is to be selected by the Chair of the Distribution SC with consideration for contrast to tank colors.
3) a test report stating: "DOE efficiency compliant".

As discussion on the above it addition to providing appropriate labeling it was felt that this was also a good way to ensure each manufacturer respected the honor system expected by DOE regulation.

The 2nd motion was:
The Chair of the Distribution SC was given the authority to act at his own discretion to find a way to implement the above motion in IEEE distribution transformer standards as expediently as possible through an errata to an existing standard ..... other through other similar means.

SC chair will work to start the process to identify the means and vehicle to make this happen. If we do not then users will come up with 50 different ways to do it.

Jerry Corkran brought to the SC attention work being done in the C57.12.90 WG as related to changing how heat run tests are being done. He stated the requirements are not flexible enough to allow for differences between a small distribution transformer and a large power transformer such as the differences in the time constant. He asked everyone to provide input so the end product is acceptable to all.

The meeting adjourned at 11:30 AM