

# *PCS Working Group on General Requirements C57.12.00*

## *Performance Characteristics Subcommittee IEEE / PES Transformers Committee*

*March 24, 2014 4:45 PM*

*Savannah Marriott Riverfront Hotel  
Savannah, Georgia, USA*

The PCS Working Group on General Requirements for C57.12.00 met on Monday, March 24, 2014, with **44** members and **68** guests present. As the Working Group membership stands at **80** members, we did have a quorum and were able to conduct official business. The following **18** guests requested membership, which will become effective only after attending two (2) consecutive meetings :

Alan Traut	Power Partners
Aniruddma Narawane	ABB
Daniel Blydon	Baltimore Gas & Electric
Emil Bercea	ABB
Jarrold Prince	ERMCO
Javier Arteaga	ABB
Jeff Golarz	Lumasense
John John	ABB
Juan Saldivar	Prolec GE
Mario Locarno	Doble
Mark Lachman	Doble
Leopoldo Rodriguez	Efacec
Paul Morakinyo	PSE&G
Rebecca Smith	Schneider Electric
Rhett Chrysler	ERMCO
Amitabh Sarkar	CG Power
Shamaun Hakim	CG Power
Ewald Schweiger	Siemens

The Chairman opened the meeting by stating the purpose of the Working Group, which is to address matters pertaining only to performance characteristics in standard C57.12.00. Following introductions and circulation of the attendance sheets, the new Chairman, Tauhid Ansari was introduced.

Next, the proposed Agenda was presented and accepted by the members present, and the minutes from the St.Louis meeting were approved as submitted (**Kenneth Skinger** and **Joe Melanson**).

### **Discussion on Old Business topics**

- A. **WG Item 99, Clarification of Ratio Requirement for LTC in Bridging Position.** This item arose as a topic for discussion due to issues when measuring turns ratio of transformers with reactance type tap changers when in the bridging position, since the excitation current drawn by the reactor can load the test circuit and cause misinterpretations in the measurement. A clause to address this matter was proposed in the previous meeting and surveyed among the PCS / WG membership.

141 Surveys Sent  
62 Responses (44.0%)  
54 Affirmative (91.5 %)  
5 Disapprove ( 8.5%)  
3 Abstain

The Chairman presented a slightly revised version of the proposed paragraph incorporating a couple editorial suggestions from the Approval Comments, and then what next steps should be taken :

1) Resolve what to do with existing proposal – accept, modify for text changes as indicated, or reject.

Discussion

M.Perkins stated that it is not necessary to add clarification, as appropriate test equipment should be used instead. (This was the basis for 2 of the negative votes). With no further comments, the motion was made (Ajith Varghese, Ewald Schweiger) to send the proposed new text as presented to the Standards Committee, with results of **30** members in favor, and **one** against (M. Perkins).

The following two items did not raise any discussion to support a motion and were not further considered.

2) Should another WG item be initiated to address the objections from one negative voter and one approval with comments, regarding issues they have regarding the preceding clause?

3) Should another WG item be initiated to address the approval comment about nameplate voltages being based upon equal step voltages, while in actuality it is common that turns per tap may be unequal?

Next Agenda Item was presented for discussion.

#### **B. WG Item 97, C57.12.00 -2010 Table 18 Routine, design, and other tests**

Change requested to provide details for the operational tests on the LTC equipment, under full voltage (during No-Load test) and under full current (during Load loss test) be described in C57.12.00. The details of the LTC operational test should be described in C57.12.90, but the requirement for the test itself needs to be added here.

A “study group” consisting of Joe Foldi, Tauhid Ansari, and Rainer Frotscher have been working to refine a proposal for the operational test requirements for the LTC in C57.12.00, Table 18. As part of the WG session, a presentation was given by Rainer (from Reinhausen), related to Load Tap Changer testing in the transformer factory. This presentation will be posted on the WG website.

At the conclusion of the presentation it was stated that

- a) DGA is not a generally applicable method to monitor tap changer performance during factory functional tests, as different types of tap changers have different gas generation characteristics. Only some basic control tests, as for example monitoring of gases in the main tank, before and after the functional tests of resistive tap changers, can be considered for recommendation at this stage.
- b) Static resistance measurement of windings for each tap changer position is a feasible, meaningful test to perform in the transformer factory, with some impact on manufacturing cycle. It can detect electrical contact problems.
- c) Dynamic resistance measurement (DRM) can provide factory reference fingerprints, to detect future tap changer issues by changing taps. However, for application on the transformers test floor it requires an expert to interpret resultant charts, therefore it is considered more appropriate for field testing.

The following arguments were raised during intensive discussion within the WG session:

- Load tap changer devices are fully tested before leaving the tap changer factory and, in general case, it should not be necessary to test them again at the transformer factory.
- For application of DGA, would it even be possible to provide some threshold values for bad gas data?
- It was pointed out that operational tests for transformer auxiliary devices are already stated on Table 18 of C57.12.00; however, how to perform the tests is not clear from present text.
- WG C57.12.90 is responsible for describing test procedures, but C57.12.00 has to define which specific tests have to be performed.

The Chairman recommended that the Study Group add a representative of (at least) one more manufacturer of on-load tap changers. The Study Group must first determine the need and feasibility of the functional test, and then provide recommendation on how to proceed with minimum impact to transformer test time. Once these requirements are known and approved, a request will be made for the PCS WG C57.12.90 to develop the test procedures.

As time was expiring, the meeting was adjourned at 6:00 PM with Kenneth Skinger and Phil Hopkinson, as first and second in this motion.

Respectfully Submitted

Steven L. Snyder  
Working Group Chair on General Requirements C57.12.00

Enrique Betancourt  
Secretary