10.1 C57.13 Instrument Transformers – R. McTaggart – Unapproved Minutes

- The Instrument Transformer Subcommittee met on Wed March 14 at 8:00 AM.
- 11 of the 20 members plus 15 guests attended
- 5 guests requested membership

Chair's Remarks & Announcements

- The schedule for future meetings was presented
- The previous meeting's minutes were approved as written
- The status of all C57.13 standards was reviewed

10.1.1 Task Force Report: PARTIAL DISCHARGE IN BUSHINGS AND VTs/CTs

The task force on Partial Discharge in Bushings and PTs/CTs met on Monday March 12th, 2012, at 4:45pm with 37 attendees. Of those, 12 members and 25 guests with 6 guests requesting membership.

- The meeting was opened with attendance sheets and introductions.
- The minutes for the F11 Boston meeting were presented.
- The TF Chair presented a draft version of the guide which was distributed by e-mail prior to the meeting.
- The scope for the guide was presented and adjusted based on feedback from the group. It is the intention to present the scope in the application for the PAR, keeping in mind that the document will be a guide. At this time the scope reads: **"this guide describes the test procedure for the measurement of PD and electrical PD detection, occurring in bushings and instrument transformers during dielectric tests in AC and DC (bushings) applications".**
- Several editorial and contents changes were recommended and the meeting was dedicated to discussions on the body of the document.
- The TF work will not cover acoustic PD detection.
- It was pointed out that the guide should cover both narrow and wide band measurements. A specification of frequency range should be included in the guide.
- It was discussed whether interpretation of PD patterns should be included in the guide. Even if PRPD (phase resolve PD) patterns are not available from many TF members, it was concluded that PRPD patterns will be included in the guide, particularly basic patterns.
- The linearity and validity of the calibration between 50% and 200% of the calibration value was discussed. This may be related to the calibrator only. If a switched calibrator is used, the change of capacitance vs. pico-Coulomb output may affect the result of the calibration.

- The uncertainty of the tests should be considered during the test as there are several factors contributing to it including the calibration, test equipment, detecting equipment, etc.
- A revised draft will be circulated shortly for comments. Members are encouraged to send their comments and suggestions to the TF Chair.

10.1.2 Working Group on Current Transformers with mA range (PE/TR/PE/TR/Instrument-WG C57.13.7) - Henry Alton

Following introductions, the agenda was presented and accepted. The agenda was as follows.

1. *Introductions*

2. *Acceptance of the Agenda*

3. *House Keeping* - ***Henry Alton of Triacta Inc.***
    a. *Review actions from the last meeting*
    b. *Answers to questions from the last meeting*

4. *Presentations*.
    a. *NRC Testing* - *Test result summary 0.15 Class against standard*
    b. *Thomas Sizemore* - *test result summary*
    c. *Paul Millward* - *test result summary*

5. *Next Steps*
    a. Final review round of document
        i. No new input for document
            1. Clean-up comments submit existing content
    b. Standard publication Process
        i. Wide IEEE review of this new standard
    c. Closure of this phase of Working Group activities
    d. Propose a Ph II initiative by this working group to investigate CT Burdens 5A & mA

Old Business (House Keeping)

There was only one piece of old business.

6. ***Henry Alton*** to provide some background clarifying the standard burden numbers will be given to support the previous action. *Working Group* to provide some more clarity on the burdens and make them more "Real World. There will be an update to this to reflect sources and approach.
    a. The burdens were initially taken from Measurement Canada LMB-EG-07 Table 21and calculated back to 80mA and 100mA secondary.
    b. Considers wire and meter impedance.
    c. The historical start-up of this project was entirely predicated on the mA CT family being treated in the field, the same way that the 5A is.

d. This became a discussion of the Bx.x values not being desirable and a suggestion from Randy was to use the VA ratings across the board. This was discussed further. Please see New Business for more details.

New Business

A brief view of the NRC test report was given by Henry Alton as an example of how the mA CT samples performed as expected against the draft standard which, as content, is also the
S-E-09 regulatory requirement for Canada. Some approvals have already been conducted against in Canada.

A review of testing of similar components was given by ABB Inc. Thomas Sizemore. This testing reflected a wide range of burden i.e. very low burdens to very high burdens beyond the low and high limit of the CT. This was their approach to establishing what kind of characteristics this CT type has. There were no specific parameters given or requested. The components did again appear to be within the limits of the proposed standard, even though he exact value of burden was not requested.

A review of testing of the identical components as tested by ABB Inc. was also tested by Paul Millward of ITEC. Paul did ask what the burden of the component was and was given B0.005 as indicated in tables2 & 3. The results given here were also found to be within the limits of the standard. Adnan Rashid from Measurement Canada commented that the ITEC report seemed unusually accurate and requested that the test setups be explained to understand the results better. An action will be taken to clarify this. Please see the action section for further details.

Randy Mullikin of MERAMEC Electrical Production had the following last minute questions as email and repeated his position on the dislike of the Bx.x again in the meeting. The questions were as follows;

5.0 Ratings.

Currently two tables, 80mA and 100mA. What if there is an addition of say yet another secondary current, say 150mA or 200mA or even 50mA. Does that mean that every time a new secondary is developed for whatever purpose, a new table must be generated?? I guess the question is, Is a table really required here?? Are we saying these are the only primary currents for each secondary??

6.0 Rated Burden.

I am totally against the use of Bx.x derived from a 5A basis, they are totally confusing. For example, B0.01 = 39 Ohm impedance – I can see that just by looking at it (NOT). What is wrong with going to a different system, say VA when non-5A designations are involved?? Makes better sense to me, the burden has meaning based on the secondary current, and again eliminates multiple tables. Especially if new currents evolve – does that mean a whole new set of burdens??

I for one would be in favor of a uniform burden across the board not dependent on ratio or secondary current. Perhaps some combing of burdens in Tables 3 and 4 to create one uniform table based solely on VA. Maybe a better understanding of how these burdens came to be - How did 39 Ohms evolve?? Who derived them??

And why 0.9PF?? IEC permits burdens less than 1VA to be up to unity PF.

The answers given;

- ***5.0 Ratings***
  - *Different secondary currents, does mean that there will be different rating tables at this time. This is intended to reflect burdens that can be met with these specific secondary currents and through compliance testing, using the same methodology as 5A secondary devices.*

- ***6.0 Rated Burden***
  - *The entire project for a standard was based on "CTs with mA secondary Currents" being treated the same as 5A secondary, to afford them the same ability to be left in a panel and have only the meter equipment pulled for re-verification. These are the rules in Canada for 5A secondary CTs today. The desire is to have a spec. and a standard that allows the "mA CT" to be treated the same as a 5A secondary CT against the relative burden that a mA category can handle thus the 5A comparison.*
  - *The Bx.x is burden development is the same rational that was used for the 5A secondary for the purpose of affording them the same treatment.*
  - *Any desire to change this approach as modelled after the 5A process should be starting with the 5A process.*
- ***PF .9 vs 1.0***
  - *The values given were from LMB-EG-07 Measurement Canada regulatory requirement.*
- ***C57.13.6***
  - *The original seed for "CTs with mA Secondary Currents" was from this standard. If this standard is becoming obsolete, please state the reference of the replacement standard.*

Randy would really like to see the Bx.x dialogue go away entirely however there was commitment to leaving the standard as is provided that there would be some notes clarifying the meaning of the same Bx.x number in the context of a "mA CT". Please see the motion made today for further details on this point. Randy also asked whether one CT could cover all burden ratings. The answer from Adnan was "No".

Motions

- Proceed with the existing content, in context with the meeting today, after a 2 week final review period and addition of some clarifying commentary and removal of some items no longer in scope and closure of any remaining actions.
  - Voltage TXs are now out of scope for this 1st release
  - State the Max. system voltage
  - Provide a foot note clarifying the use of the Bx.x terminology in context with this standard.

Accepted

Actions

- ***Thomas Sizemore & Paul Millward*** to provide some details on the test setup used to perform the testing in each of the test cases where test results were given.
- ***Henry Alton*** Provide a foot note for the Burden differences.
- ***Henry Alton*** Provide a final version standard draft, considering the Motion and Actions.

10.1.3 Working Group for Revision of IEEE C57.13 Instrument Transformers
R. McTaggart

The WG met on Tues March 13 with 13 of the 19 members present (Quorum attained) along with 14 guests - 4 of whom requested membership. This will be dependent on participation. Of the members present, approx ½ had downloaded the draft std from the website.

The revised table 2 showing dielectric test levels was discussed . No objections were raised so it will remain as-is for now. There were also no objections to the elimination of the original table 3.

The new table 3 showing creepage distances was reviewed. Some suggested adding more classifications but most agreed 2 is enough.

The Partial Discharge requirements were discussed at length. The key issue was prescribed extinction voltage (PDEV) requirements. The present draft is consistent with C57.13.5 and similar to IEC but many believe these values are too high, particularly for voltages below 115 kV. The rationale for this is that NA systems are effectively grounded as a rule. The opposing arguments included the conclusions of the EPRI study which recommended higher levels and the concern that if the IEEE levels are lower than IEC it could be perceived that the NA instrument transformers are of lower quality. Many options were discussed:

- **Leave as-is**
- **Reduce PDEV to 1.2 x max system V / sqrt 3**
- **Reduce PDEV to 1.2 x max system V / sqrt 3 for < 115 kV only**
- **Reduce PDEV to 1.35 x nominal system V / sqrt 3**
-

If levels are to be reduced then an informative note is to be added regarding considerations for ungrounded systems.

In response to a suggestion that the pre-stress voltages should be lower, it was pointed out that the prestress voltage is meant to simulate switching surges which might initiate PD and that 80% of Applied Voltage is representative.
It was agreed that formulae would be included to allow calculation of levels for unlisted voltages.
As there were too many issues to resolve in the meeting, it was agreed that an Email survey would be done.

The clauses on CT & VT Accuracy measurement methods were discussed and it was agreed that they are no longer relevant and that they should either be removed or moved to an appendix.
The new draft Appendix for SubStation Voltage Transformers (SSVTs) was distributed and discussed. Comments included the need to clarify chopped-wave voltages and the specification of Partial Discharge requirements to be specified. The draft will be reviewed and revised by a small group led by Dave Wallace and then emailed to WG members for comment.

The plan is to produce the next draft and receive comments before Fall 2012 meeting (Oct 23, 2012)

Old Business: none

New Business:

Tom Prevost explained the Transformers Committee plans to offer tutorials at each meeting. Attendees were encouraged to provide possible subjects to the SC Chair. One suggested possibility is the specification and applications of SSVTs

Adjournment