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

- The Instrument Transformer Subcommittee met on Wed Nov 2 at 8:00 AM.
- 8 of the 16 members plus 15 guests attended.

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 October 31st, 2011, at 3:15pm with 50 attendees. Of those, 12 members and 38 guests with 3 guests requesting and granted membership.

- The meeting was opened with a request for patent disclosures and introductions.
- The minutes for the S11 San Diego meeting were presented. Volunteers were reminded of the previously offered contributions to the draft; W. Hauschild offered to have the section of shielding ready for next meeting after clarifying details with the Chair.
- The TF Chair presented a draft version of the preferred connection diagrams for carrying out PD tests in laboratory settings for transformer bushings and instrument transformers both in balanced method and open-end method. Also, alternate connection set ups were presented and discussed. These diagrams are intended to be part of the guide. The diagrams will be e-mailed to the members of the task force for review and comments.
- The TF Chair presented a table summarizing the different aspects to be considered prior and during the PD test including physical set up, oil tank size, use and size of corona rings, use and size of static shields in the oil side of a bushing, influence of ground planes during the test, cleaning and preparation of equipment prior to the test, set up and test connections and instrumentation. This table will be e-mailed to the members of the task force for review and comments.
- The final item in the agenda was a presentation by Barrett Wimberly on Routine partial discharge for CTs 72.5 kV and 800 kV.
- TF Chair Thang Hochanh requested comments and feedback from the members regarding the material and schematics presented.
- Meeting was adjourned at 4:30 pm.

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

Thirteen guests attended this working group on a "Standard for Current Transformers with 250mA range secondary current".

Following introductions, the agenda was presented and accepted. The agenda was as follows. Patent issues were not discussed as they are now dealt with differently.

1. *Introduction*

2. *Patent Issues*

3. *Acceptance of the Agenda*

4. *House Keeping* - ***Henry Alton of Triacta Inc.***
    a. *Review actions from the last meeting*
    b. *Answers to questions from the last meeting*
    c. *Re-schedule Paul Millward's testing*

5. *Presentations*.
    a. *NRC Testing - Recap from Eddy So*
    b. *NRC Test Results Overview – Eddy So*
    c. *Cooper Industries CT offering in the 200mA secondary category – A few words on this and acceptance*
        i. *Technical Profile for Standard – Eddy So*
    d. *Open Discussion/Questions & Answers*
    e. *Burden values*

6. *Next Steps*
    a. Final review round of document
        i. Burdens
        ii. Any other requirements that should be stated for this standard
            1. Voltage limit? 600V limit for this standard
        iii. Send updated draft with additions of new categories.

Old Business (House Keeping)

Action items and comments from the last meeting were reviewed. Any actions that remain open will be re-stated in the action section of this document. What follows are the actions closed and resolutions from the last meeting.

- The topic of seeking coverage of a wider range of CT with 250mA secondary current and below.
    - No new categories beyond the existing 80mA and 100mA categories were added
    - One offer was tabled and rejected as it was a control device not a CT used with an electricity metering device.
        - *Action to review scope of C57.13.6 to see whether CTs used in control circuits are relevant.*

- Express the limits of the parallelogram in a different form (Accuracy Limits Figure 1, 2)
    - *Motion and acceptance to leave these sections as they are.*
- Standard burdens were also discussed and a point was made about specifying impedance based on VA instead of these standard burdens. There is a need to investigate the test fixtures being developed by the National Research Council of Canada (NRC) to see whether there would be any impact in using this alternative *(any considerations of standard burdens that may have been designed into the fixture)*. The burden rating numbers in the table should be clarified. (See actions)
- ***Henry Alton*** to provide some information on the materials used. **Closed**
    - Status Update: Showed this information to a working group participant at the last meeting. Re-iterated Fe-based NANO-crystalline.
- ***Henry Alton*** to provide the specification limits for signals immunity tests that would be present when an energy measurement is being made.

    Closed
    - Status Update (Nov01/11): Provide relevant EMC specs from
        - MC LMB-EG-07 Section 6
            - 3-5.2.2 and 3-5.2.3 below. Further details relating to these tests may be found in MIL-STD-461B.
        - EN55022 Class A, Class B-Immunity under operation
            - Equivalent to IEC 61000-4-6
        - IEC 61000-4-6, Electromagnetic compatibility (EMC)
            - Part 4: Testing and measurement techniques — Section 6: Immunity to conducted disturbances, induced by radio-frequency fields

New Business

A presentation of the calibration methodology was provided by Eddy So. The issue of voltage characteristics affecting measurement was again raised. It was noted in one of the simplified diagrams that there was no ground shown. There was one used. There was commentary that;

- Current via capacitance was able to flow directly to ground and that there should be consideration of this capacitance.
- Lower voltages classes where there is no shielding used may impact the accuracy.
- Milliamp CTs should be capped at 600V

A CT offering for addition of a category of CT, having a secondary output current of 200mA was discussed. The application of this CT was expressed as given by the representative from Cooper Industries.

> *As you know, we manufacture Step Voltage Regulators, which are single phase regulating auto-transformers with self contained control systems. In accordance with our standard (C57.15 Section: 6.6.1-a), all regulators are equipped with an internally mounted CT. Further by reading section 9.2.1-d you would discover that the standard intends the internal CT to have a nominal secondary current of 200mA. This CT is provided for Line Drop Compensation, by which means, if the distribution line parameters are known between the point of regulation and the load, the voltage drop on the line from the regulator (point of regulation) to the load can be calculated based on knowing the load*

current and this drop can consequently be compensated for.

As profiled the application that this CT was expressed for was proposed to be other than for use in an electricity metering application and that this standard was specific to electricity metering applications. In discussion of this there was also some mention of Optical CTs.

Motions

- The standard should be clarified to reflect that the CTs types that are for use in electricity metering applications only. This would be acceptable with the condition that there is no allowance for the same function in C57.13.6 which is where this standard is modelled from.
  Accepted
- If no new categories of CT become evident in 30 days from today, this standard will proceed to the review stage with what it presently contains. **Accepted**
- The first release of this standard will be capped at 600VAC. **Accepted**

Actions

- ***Vladimir Khalin*** to recover the CTs and forward them directly to Paul Millward.
  - Formalize data from initial testing and provide to Chairman.
    - Detail how testing was performed **Nov30/11**
  - Forward the same samples to Paul Millward. The desire is to compare data based on the same samples.
    Nov30/11
- ***Paul Millward*** to provide some test results on the same CTs that were being evaluated by Vladimir. **Jan30/12**

7. ***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.
8. ***Working Group*** *to review the document and provide comments. A conference call will be arranged to review all comments.*
   Feb15/12

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

This working group met on Nov 1 with 14 of the 20 members present.

The results of the survey on the applicability of C57.13.5 were reviewed and the conclusion that it should apply only when specified was clear. Next, the results of a complete review of the standard were discussed. A first draft will be prepared based on written and verbal comments, with the main changes being:

- 1 table for dielectric test voltages instead of 2
- Incorporate the high accuracy requirements of C57.13.6
- Proposed changes to section 8.1 to be included
- Bushing CT appendix

- Changes to PD requirements (more discussion needed)

The draft will be reviewed in the next WG meeting.

Dr Eddy So made a presentation on the effects of voltage and load PF on CT accuracy, including test results on a 96 kV Combined VT/CT. The effect was present and more testing is planned.

10.1.4 New Business - Inclusion of Substation VT's in C57.13

This was discussed and although many supported it, some were also opposed. It was proposed that the instrument transformer requirements should apply along with tests for % Impedance, regulation, etc. It needs to be addressed in the WG at the next meeting.

10.1.5 Adjournment