

Annex E HVDC Converter Transformers and Reactors Subcommittee Meeting Minutes

March 24, 2014, 3:15 pm.
Savannah Marriott Riverfront Hotel, Plaza meeting room
Savannah, Georgia

Chair: Michael Sharp
Vice Chair: Les Recksiedler,
Secretary: Ulf Radbrandt

E.1 Introductions and circulation of Attendance List

Introductions were made and the attendance list circulated.

There were 12 members and 27 guests present. Five of the guests requested membership

The total membership of the SC (not including corresponding members) is 16. We needed at least a total of 8 members (50% of 16) to be present in order to have a quorum. This was achieved.

The agenda for this meeting was approved.

E.2 Approval of the minutes of the October 21, 2013 meeting in St. Louis, Missouri

The minutes from the St. Louis meeting (Fall 2013) were approved.

E.3 Brief report on the meeting of the Administrative SC.

Many of the topics discussed at the administrative subcommittee meeting on Sunday were already presented at the opening session meeting on Monday.

There was one item from the administrative subcommittee meeting that is of particular importance to our subcommittee at this time. There is one new level for approval for proposals for dual logo standards. After approval by our SC, there must be an approval by the administrative subcommittee before a PAR is created and submitted for approval.

Our standard for converter transformers (C57.129) will expire in 2018, i.e. within 4 years.

Our standard for smoothing reactors (1277) will expire in 2020, i.e. within 6 years.

E.4 Presentation from the Joint IEC/IEEE meeting, regarding a possible dual logo standard for converter transformers, in London 6-7 February 2014. .

Ulf Radbrandt gave a presentation regarding the London meeting about:

- The participants
- The process of the work. The work started with the Excel file, with comparison between the IEEE and IEC standards, that was created by an IEEE group before the previous IEEE meeting in St Louis. The “Comparison” sheet of that Excel file was extended with two new columns, one for comments and one for a complexity level for each clause of the standards. The complexity levels

were 1 to 5 where 1 is “Easy” and 5 is “Very hard”. All clauses were not evaluated due to lack of time. The evaluation was focused on the clauses that were evaluated by IEEE to “Difficult” and “Quite Similar”, which are the clauses that would require most work.

- The findings. The items that were considered to require most work were the different methods for loss measurements and the different reference temperature for loss and impedance determination. The estimated number of clauses for each complexity level (complexity levels are within parenthesis) was 17 (1), 22 (2), 8 (3), 1 (4) and 3 (5).
- The proposed structure of the possible dual logo standard.
- The reference to different standards.
The IEEE standard refers to a lot of other IEEE standards and the IEC standard refers to a lot of IEC standards. This could be handled in a dual logo in the same way as in other ongoing dual logo standards. The method is that the user must select if the standard is to be used as IEEE or IEC. In the standard there are selections, in several locations, between e.g. IEEE references or IEC references.
- The conclusion from the meeting, which was that it should be possible to resolve the differences and agree on a dual logo standard.

The presentation will be distributed to all SC members.

E.5 Discussion and finally a decision whether or not we will start a joint WG together with IEC to go for a dual logo standard.

E.5.1 The different methods for IEC and IEEE for measurement of losses

Pierre Riffon pointed out that there had previously been an investigation regarding the different methods of loss measurement. He also said that the IEC method is only accurate for certain ratios between eddy losses and stray eddy losses. The IEEE method, which generally was developed by Alan Forrest at Teshmont, was considered most accurate. The method was developed for the use of a watt-meter but the use of spectrum analyzer is also possible. Peter Heinzig made a presentation regarding the comparison several years ago, but since he has changed employers since then, he doesn't have access to that presentation. Pierre Riffon said that it should be possible to repeat that comparison based on new data from the different methods. Alan Forrest is probably available for consultation too.

It is possible to have 2 methods for loss measurement but that should, if possible, be avoided since it makes the standard more difficult to use. If we go for 2 methods, then a possibility is to have the method default selected by the selection between IEEE and IEC, which defines which references that should be used throughout the standard. It will probably be very difficult to get acceptance, within IEEE, for a dual logo standard if the IEEE method is removed.

E.5.2 Different reference temperature for losses

IEEE has 85°C and IEC has 75°C as reference temperature for determination of losses. One reason for the higher value for IEEE might be the very common usage of thermally upgraded paper.

At the London meeting there was a proposal to have four alternatives for reference temperature:

1. 85°C (for IEEE)

2. 75°C (for IEC)
3. Selected by the customer
4. Determined by the manufacturer, i.e. calculated for the rated loading of the actual transformer design.

Alternative number 4 could be the most precise method but it might be more difficult for the customers to evaluate different transformer designs (by different manufacturers) with this method. The IEC standard IEC 61803 for determination of HVDC converter station losses does now include this alternative.

E.5.3 Harmonics for determination of temperature rise and hot-spot temperature

The harmonics for determination of temperature rise and hot-spot temperature should be given for the worst case operating condition but it should be from an actual operation case. i.e. worst case harmonics should not be taken from different operation cases because the hot-spot factor would then be too conservative. This should be clearer in the standard.

E.5.4 Harmonics for determination of audible noise

The harmonics for determination of audible noise should be different from the harmonics for determination of temperature rise. The harmonics for determination of audible noise should not be from worst case but from nominal operation condition.

E.5.5 The clauses for audible noise

There has been a lot of work with IEC 60076-10 and IEC 60076-10-1, where Christoph Ploetner has been the convenor.

E.5.6 Participants from IEEE

There must be more people from IEEE that participate in the joint review work. Most IEEE participants have problem to travel to Europe. All IEEE SC members are encouraged to send in comments on the work. In the first hand comments can be given on the Excel file. Comments should be sent to all members of this SC.

E.5.7 Planned coming joint meetings.

The following meetings are planed together with IEC

2014-05-14--15 in Stockholm

2014-10-23--24 Washington DC (At the IEEE Transformers meeting).

We should have joint meetings at each coming IEEE meeting, with intermediate meetings elsewhere, until the dual logo draft is finished.

E.6 Forming of a working group within IEEE, which will work with the dual logo standard

A motion was put forward by Eric Davis and seconded by Klaus Pointner to go for a PAR, which would include the creation of a new dual logo standard for converter transformers and the formation of a WG

that will work together with the IEC MT to create it. The vote result from SC members was reported at the meeting as 11 for and 0 against. We should therefore start that process.

This PAR will not be approved until after the Stockholm meeting.

A motion was put forward by Eric Davis and seconded by Gene Blackburn to, until the PAR is approved, form a TF that will continue with the preparation work, write up the PAR and join the Stockholm meeting. When the PAR is approved, the TF will be changed to a WG. The vote result from SC members was reported at the meeting as 10 for and 0 against.

E.6.1 Request for members

At the meeting, volunteers to join the TF were Eric Davis and Ulf Radbrandt (who will be the chair of the TF). A request was made for all others interested in joining the task force and attending the Stockholm meeting to inform Ulf Radbrandt and Mike Sharp ASAP.

E.7 Brief review of the slightly modified annex for converter reactors provided by Klaus Pointner

Klaus Pointner gave a brief presentation of the work with the annex for converter reactors that will be included in IEEE 1277 Smoothing Reactors. The annex has been submitted to SC members prior to this meeting. There were no comments made at the meeting but all SC members were encouraged to review the document again and provide any comments they have before the next meeting.

E.8 Adjournment

The meeting was adjourned at 4.17 pm.