

Annex E HVDC Converter Transformers and Smoothing Reactors Subcommittee

**October 30, 2017, 3.15 pm
Louisville, Kentucky, USA**

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

E.1 Introduction / Attendance

Introductions were made and the attendance list circulated.

There were 11 members and 14 guests present. No new requests for membership were received.

The total membership of the SC is 17. We needed at least a total of 9 members 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 April 3, 2017 meeting in New Orleans

The minutes from the New Orleans meeting were approved.

E.3 Brief report on the meeting of the Administrative SC by Mike Sharp

The ballot resolution group created to review ballot comments must always report their results to the working group for approval.

A reminder was given that to become a main committee member you need IEEE, PES and SA membership.

The web page of each SC and WG should regularly be updated.

A new power point template for the 100 years anniversary has been created and it is available for new presentations. The new template should be used for all PowerPoint presentations at the spring meetings in Pittsburgh.

Peter Balma is organizing all special activities for the 100th anniversary meeting. If anyone has any ideas for commemorative gifts or has the desire to help with the tasks please see Peter. Peter is also looking for any pictures of old transformers circa 1918 that he could use.

SC and WG minutes must be submitted to Bruce Forsyth latest December 14 this year.

Reminder that IEEE C57.129 will expire in 2018 and IEEE 1277 will expire in 2020.

E.4 Working Group Reports

E.4.1 WG IEC/IEEE 60076-57-129 – Transformers for HVDC applications

Chair: Ulf Radbrandt (IEEE) and Mats Berglund (IEC), Co-Chairs

Ulf Radbrandt made a presentation regarding the status of the work with the dual logo document. The highlights of that presentation and following discussions are as follows:

- The background as to why the IEC editorial changes were not reported to the WG and at FDIS stage, when no further changes were possible, has not clearly been explained. Most of the changes, not only editorial, were good though. Paul Jarman explained that this is usually done in relation to the CDV but for some reason this was not done until FDIS. One change that made the document less clear was the removal of the explanation about how to handle single references. This was probably done to have that section more similar to other dual logo standards. We can anyway live with the writing as it is today.
- IEC FDIS were approved, 96.2% in favor
- IEEE Recirculation Ballot #2 (same as FDIS) met the 75% affirmation requirement. The result was, 96% affirmative (2 negative).
- IEC status: Ready to publish on 9 November 2017
- IEEE status: Approval given to publish by RevCom and SA Standards Board
- IEC SMB has published a guide that describes how to work with dual logo standards.

E.4.2 WG IEEE P1277 - Dry-Type and Oil-Immersed Smoothing Reactors and Dry-Type Converter Reactors

Chair: Klaus Pointner (klaus.pointner@ieee.org)
Vice-Chair: -
Secretary: Ulf Radbrandt (temporary)

E.4.2.1 Introductions and Call for Patents

This was the second meeting for this WG. It was conducted as part of the HVDC SC meeting.

The WG chair, Klaus Pointner, asked the members if they are aware of any essential patent claims that could affect the work by the WG but nobody expressed any knowledge of such claims.

There were 10 members and 15 guests present. 1 guest requested membership,

The total membership of the SC is 16. We needed at least a total of 8 members to be present in order to have a quorum. This was achieved.

The agenda for this meeting was approved.

The minutes from the New Orleans meeting were approved.

It was decided that we should have separate minutes from this WG.

E.4.2.2 Review of the Draft 1 of the standard.

The title has been updated to “IEEE Standard General Requirements and Test Code for Dry-Type and Oil-Immersed Smoothing Reactors and for Dry-Type Converter Reactors for DC Power Transmission” according to the PAR.

The Introduction and the Scope are also updated according to the PAR.

There was not a Purpose section in the old standard but that has been introduced now.

References are not updated yet. They should be undated as much as possible.

Nominal inductance has been described for converter reactors. That should also be described for smoothing reactors.

Converter reactors has been added to the description of rated dc current.

Description of rated ac current has been added for converter reactors.

Converter reactors has been added to the description of rated dc voltage.

Description of rated ac voltage has been added for converter reactors.

Description of harmonic currents has been added for converter reactors. The description of ripple current for smoothing reactors should be changed to explain harmonic currents. This can then be the same for both smoothing reactors and converter reactors.

A description of the location of converter reactors, which are covered by this standard, has been added to the Definitions section. This description should be moved to the Purpose.

An explanation that converter reactors built in dry-type air-core and air-cooled design has been added to the Definitions section. This explanation should be moved to the Purpose.

An explanation, that converter reactors are also often installed indoor under controlled environment, has been added to Clause 6.1.2 “Temperature”. Ambient temperature profile should be stated together with the minimum humidity.

Examples of typical overload requirements can be removed in clause 6.2.3 “Loading at other than rated conditions”, but we should include that the purchaser should specify any overload requirements.

References to building standards have been removed in clause 6.2.4 “Seismic conditions”.

Very fast voltage transients has been removed since the equipment in this standard are never connected to GIS in clause 6.2.5 “Other unusual service conditions”.

Description of cooling classes has been replaced by a reference to IEEE C57.12.00 in clause 7.6 “Cooling classes”.

A new clause 8. “Rating data of converter reactors” has been added. Rated system frequency should also be added.

Design considerations should go to an informative annex.

Measurement of stray capacitance should be added as a special test. Both capacitance across reactor and to earth should be measured.

Temperature limits should be updated according to the latest standards.

Christoph Ploetner volunteered to update the sound sections according to other standards.

E.4.2.3 Plan for the coming work

The chair, Klaus Pointner, will update the draft and distribute Draft 2 after the meeting. The chair will then request comments to that draft.

The document should be finished 2019 since the present standard expires 2020.

E.4.2.4 New Business

Pierre Riffon commented that the RIV test is not good for dc applications. Pierre will do a proposal for update of this.

The chair, Klaus Pointner, requested help to review and update the annexes.

Annex F, Smoothing reactors for 800 kV ultra high voltage direct current (UHVDC), is straight forward according to the main part of the standard and can therefore be removed.

E.4.2.5. Adjournment

The WG meeting was adjourned and the SC chair, Mike Sharp, took over with the SC meeting.

E.5 Old Business

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E.6 New Business

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E.7 Adjournment

The meeting was adjourned at 4.16 pm.