Annex E Transformers and Reactors for HVDC Applications Subcommittee

October 17, 2022, 4.45 pm local time – Symphony 6,7 at the Sheraton/LeMeridien Charlotte NC

Chair: **Ulf Radbrandt (ulf.radbrandt@ieee.org)**
Vice Chair: **Les Recksiedler (lrecksiedler@yahoo.ca)**
Secretary: **Klaus Pointner (klaus.pointner@ieee.org)**

E.1 Introduction / Attendance / Approval of the Agenda / Essential Patent Issues

There was a total of 21 persons in the meeting, 14 members and 7 guests present. 1 new request for membership was received. Qualification for membership in the SC will be verified by the SC Chair.

Call for patents (essential patent claim) and IEEE copyright policy have been addressed.

Actual membership prior the Fall 2022 meeting is shown below:

Last name	First name	Company name
Caverly	David	Trench Limited
Chiang	Solomon	The Gund Company
Davis	Eric	Burns & McDonnell
Ermakov	Evgenii	Hitachi Energy
Falkenburger	Thomas	Coil Innovation USA, Inc.
Gaun	Alexander	Coil Innovation GMBH
Heinzig	Peter	Weidmann Electrical Technology
Hernandez	Giovanni	Virginia Transformer Corp.
Kaineder	Kurt	Siemens Energy
Ploetner	Christoph	Siemens Energy
Pointner	Klaus	Trench Austria GmbH
Radbrandt	Ulf	Hitachi Energy
Recksiedler	Leslie	Manitoba Hydro
Riffon	Pierre	Pierre Riffon Consultant Inc.
Sharp	Michael	Trench Limited
Ziomek	Waldemar	PTI Transformers

Membership has been updated and there are 3 new members (T. Falkenburger, G. Hernandez and K. Kaineder) in the SC

14 members out of 16 members were present, quorum was met.

The agenda for this meeting, that was distributed via E-mail on Oct 3, 2022, was presented and unanimously approved.

The list of all attendees of the meeting is shown below:

First Name	Last Name	Email	Company
Gilles	Bargone	gilles.bargone@gmail.com	FISO Technologies Inc.
David	Caverly	david.caverly@trenchgroup.com	Trench Limited
Solomon	Chiang	schiang@thegundcompany.com	The Gund Company
Domenico	Corsi	dcorsi@doble.com	Doble Engineering Co.
Eric	Davis	edavis@burnsmcd.com	Burns & McDonnell
Thomas	Falkenburger	thomas.falkenburger@coilinnovation.com	Coil Innovation USA, Inc.
Alexander	Gaun	alexander.gaun@coilinnovation.com	Coil Innovation GMBH
Peter	Heinzig	peter.heinzig@weidmann-group.com	Weidmann Electrical Technology
Kurt	Kaineder	kurt.kaineder@siemens-energy.com	Siemens Energy
Oscar	Pinon	opinon@otcservices.com	OTC Services Inc.
Sylvain	Plante	plante.sylvain.3@hydro.qc.ca	Hydro-Quebec
Christoph	Ploetner	cp.xfmr@gmail.com	Siemens Energy
Klaus	Pointner	klaus.pointner@trench-group.com	Trench Austria GmbH
Ulf	Radbrandt	ulf.radbrandt@ieee.org	Hitachi Energy
Leslie	Recksiedler	lrecksiedler@yahoo.ca	Manitoba Hydro
Pierre	Riffon	riffon@sympatico.ca	Pierre Riffon Consultant Inc.
Michael	Sharp	sharp.michael@siemens-energy.com	Trench Limited
Tomas	Olsson	tomas.olsson@hitachienergy.com	Hitachi Energy
Camilo	Casallas	camilo.casallas@trench-group.com	Trench Limited
Omar	Mendez	omar.mendez@prolecge.com	Prolec GE
Waldemar	Ziomek	wziomek@ptitransformers.com	PTI Transformers

E.2 Approval of the minutes of the March 2022 Spring meeting in Denver

The minutes of the spring meeting as distributed by E-mail on October 3, 2022, have been presented and approved unanimously.

E.3 Approval of the minutes of meeting of the virtual Fall 2021 meeting and the agenda for the Spring 2022 meeting in Denver

As there has been no quorum at the Denver meeting, the minutes of the virtual Fall 2021 meeting as well as the agenda for the Spring meeting in Denver have been distributed for approval by E-mail to the members of the SC. 15 members out of 15 responded with an approval and no comments have been received.

E.4 Brief report on the meeting of the Administrative SC by Ulf Radbrandt

The key messages are:

- WGs should try to have virtual meetings in between Committee Meetings to have a good progress of the work
- WG chairs should do the Working Group Chair Fundamentals training. New WG chairs must have done it.
- Be sure to, if needed, request PAR extensions in time

Otherwise no further specific information from the administrative SC. For detailed information, please see the general meeting MoM.

E.5 Working Group Reports

There is currently no active working group. The IEEE1277 has been published 2020 (10 years stability until Dec 31, 2030). The dual logo standard IEC/IEEE 60076-57-129 was published 2017 and is good until Dec 31, 2027

E.6 Future Work

Discussion of ideas of coming work within this Sub Committee. All ideas are welcome

At the Denver Spring 2022 meeting, Evgenii Ermakov did a presentation on Condition Monitoring for transformers. The SC is planning to have a similar presentation for converter and smoothing reactors at the spring 2023 meeting. There could be sections of conditioning monitoring introduced in our standards later.

Les Recksiedler is working as part of an Advisory Board to DOE Office of Electricity Transformer Resilience and advanced components on the topic "Scalable large-scale dc-ac grid analysis methods". He is basically looking at what simulation tools are currently available and what gaps exist to promoting HVDC in the USA by DOE.

At the IEES PES meeting from July 16-20th, 2023 in Orlando Florida a panel discussion "Large Scale Interconnected HVDC networks, Value Proposition/Plans, Technologies, and Gaps" will be held.
Les Recksiedler's presentation will be "Integrating Inverter Based Resources (IBR) into the Grid including HVDC."
He will additionally give a presentation about this work at the Spring 2023 SC HVDC meeting.

E.7 Experience of the usage of the dual logo standard for HVDC transformers, IEC/IEEE 60076-57-129

The dual logo standard for HVDC transformers, IEC/IEEE 60076-57-129 is valid until 2027.

Joint revision work, together with IEC, will probably start within the next years. It can be good to start to discuss experiences from the usage of this standard.

The title of the standard is "Transformer for HVDC Applications", but it is not clearly written in the document that it is more for Converter Transformers with DC voltage stresses.

Sometimes end users wants to refer/use this dual logo standard as a main standard for the symmetrical monopole transformers, which does not have DC voltage stresses and very limited content of harmonics.

Perhaps the scope should be updated for better clarification.

Now the standard is focused on LCC schemes and the VSC application is described in the Annex. The VSC part shall be integrated to the main body of the standard.

Most of the formulas in the document using 6 pulse bridge terminology, which are not applicable for the VSC asymmetric configurations. It would be good to have some clarity around this.

The same is discussed for the dual logo DC bushing standard. Proposal for update to clarify this better is ongoing. Perhaps that work can be reused here.

For the valve side insulation levels, clause 8.3.2.3, switching impulse, states "shall be specified" but not stating that it shall come from the system studies.
However, clause 9.5, Lightning impulse test, states "The value of the lightning impulse level is based on

system studies and given by the purchaser".
A problem is that some end users want to force standard switching insulation level on the valve winding.

The wording for specification of switching and lightning impulse levels shall be harmonized. Both definitions shall come from system studies. If end users still want to have higher insulation levels than out of the studies, this should be clearly specified in their enquiry.

E.7.1 Start of joint revision work of the transformer dual logo standard together with IEC

Since this is a dual logo standard, we cannot start any revision work without IEC. The standard is valid until 2027 for IEEE but IEC does not have the same date limit. It is therefore more urgent for IEEE than for IEC to start revision work. We must contact IEC and ask if they can initiate the revision.

Chris Ploetner in his role as convenor of IEC TC14 confirmed, that no requests for changes regarding the current standard have been received from IEC users or EPC's.

It was suggested by Klaus Pointner, that the PAR request to start work on the revision shall be issued prior to the Fall 2023. However, details need to be clarified with IEC as IEC is the official owner of this dual logo standard and IEC shall start with the work on the revision as well. It was agreed that the SC HVDC Chair will, together with Malia Zaman from IEEE, clarify the details, how the process can be started.

E.8 Old Business

There was no old business

E.9 New Business

There is no new business

E.10 Adjournment

The meeting was adjourned at 5:15 pm.