

Annex E Transformers and Reactors for HVDC Applications Subcommittee

March 24, 2025, 4.45 pm local time – Mineral Hall BC Hyatt Regency Denver, Denver, Colorado

Chair: Klaus Pointner (klaus.pointner@ieee.org)

Vice Chair: tbd.

Secretary: tbd. (minutes voluntarily taken by Eric Davis – Secretary WG IEC/IEEE 60076-57-129)

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

There was a total of 32 people in the meeting, 14 members and 18 guests present. 4 new requests for membership were received

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

Actual membership prior the Spring 2025 meeting is shown below (E-Mail addresses are not shown due to privacy reasons):

First Name	Last Name	Affiliation
Sean	Barker	Hitachi Energy
Camilo	Casallas	Trench Limited
David	Caverly	Trench Limited
Solomon	Chiang	The Gund Company
Marcos	Czernorucki	Hitachi Energy
Eric	Davis	Consultant (on his own)
Evgenii	Ermakov	Hitachi Energy
Peter	Heinzig	Weidmann Electrical Technology
Kurt	Kaineder	Trench Austria GmbH
Sylvain	Plante	Hydro-Quebec
Christoph	Ploetner	Siemens Energy
Klaus	Pointner	Trench Austria GmbH
Thomas	Prevost	Weidmann Electrical Technology
Ulf	Radbrandt	Hitachi Energy
Leslie	Recksiedler	Manitoba Hydro
Hossain	Sai	Trench Limited
Lina	Sandsten	Hitachi Energy
Michael	Sharp	Trench Limited
Dharam	Vir	Prolec GE
Terry	Wong	Trench Canada Limited
Waldemar	Ziomek	PTI Transformers

14 out of 21 members were present, thus quorum was met.

The agenda for this meeting, that was distributed via E-mail on March 20, 2025, was presented. No comments received. Christoph Ploetner made a motion to approve the agenda, seconded by Peter Heinzig. The agenda was unanimously approved.

The list of all attendees of the meeting is shown below (E-Mail addresses not shown due to privacy reasons):

First Name	Last Name	Affiliation	Membership Status	Request Membership
Anthony	Alexander	Hitachi Energy	Guest	
Gilles	Bargone	FISO	Guest	
Naveen	Bhardwaj	Trench Group	Guest	Yes
Camilo	Casallas	Trench	Member	
David	Caverly	Trench Limited	Member	
Vivian	Chan	Hitachi Energy	Guest	
Solomon	Chiang	The Gund Company	Member	
Marcos	Czernorucki	Hitachi Energy	Member	
Eric	Davis	Consultant	Member	
Peter	Dopplmair	Trench Group	Guest	
Evgenii	Ermakov	Hitachi Energy	Member	
Didier	Hamoir	Transformer Protector Corporation	Guest	
Peter	Heinzig	Weidmann	Member	
Saif	Hossain	Trench Limited	Member	
Patrycja	Jarosz	IEEE SA	Guest	
Reeve	Johnson	Hitachi Energy	Guest	
Laszlo	Kadar	Laszlo & Associates	Guest	Yes
Kurt	Kaineder	Trench Austria	Member	
Omar	Mendez Zamora	Prolec	Guest	
Filip	Mikulecky	Koncar Power Transformers Ltd.	Guest	
Anthony	Natale	HICO America	Guest	
MARCELINO	PEREZ	Prolec	Guest	Yes
Christoph	Ploetner	Siemens Energy	Member	
Klaus	Pointner	Trench Austria GmbH	Member	
Bertrand	Poulin	Hitachi Energy	Guest	
Adnan	Rashid	Measurement Canada	Guest	
Michael	Sharp	Trench Limited	Member	
Christopher	Whitten	Hitachi Energy	Guest	
Stefan	Wirth	Coil Innovation GmbH	Guest	Yes
Terry	Wong	Trench Limited	Member	
Samuel	Young	Hitachi Energy	Guest	
Waldemar	Ziomek	PTI Transformers LP	Member	



Qualification for membership of the requests received will be checked and the applicants will be notified.

E.2 Approval of the minutes of the Fall 2024 meeting in St. Louis

The minutes of the spring meeting as distributed by E-mail on March 3, 2025 have been presented. No comments were given. Evgenii Ermakov made motion to approve the agenda, seconded by Terry Wong. The minutes have been unanimously approved.

E.3 Chair's Remarks

The Chair introduced himself to the SC. He provided an overview of his 37+ years in the industry.

SC Members should have received an email from IEEE about being added to the IEEE Group Roster for PE/TR/HVDC SC. Members should confirm their participation in the SC following the instructions in the email.

The Chair made the following appointments for the SC Officers:

Waldermar Ziomek was appointed to be Vice Chair.

Saif Hossain was appointed to be Secretary.

E.4 Status of the Entity WG 57.132 for development of the Guide for vibration testing of oil immersed HVDC converter transformer (Chairman: Dr. Jun Deng)

The SC HVDC is sponsoring this Entity WG. Therefore, future work of this WG is reported to this subcommittee. The actual status of the WG is outlined in the presentation submitted by the WG chair Jun Deng prior to the Spring 25 meeting. Unfortunately, the WG chair could not come to this meeting but is encouraged to do so for the Fall 2025 meeting in Bonita Springs (FL).

There was no WG meeting between the Fall 2024 and the Spring 2025 meeting. The next meeting is planned to be held in Nanchang, China in April 2025.

Status Report:

During the second WG meeting, 28 experts participated, from China Southern Power Grid, State Grid Corporation of China, North China Electric Power University, etc.)

[illegible]

Jun Deng(CSG) and Zhicheng Xie(CSG) introduce the Draft of PC57.132 part by part, respectively. The draft has been fully discussed by WG members, some suggestions have been proposed:

- In the Chapter 5, it should point out that when conducting multiple vibration tests on the same transformer, it is advisable to maintain consistent sensor positions for comprehensive analysis.
- Supplement the requirements for fiber optic vibration measurement in Chapter 7, including sensor types and installation forms, as well as requirements for voltage and current measurement devices such as load rate, range, frequency response, etc.
- In Chapter 7, it is necessary to separately describe the internal vibration measurement and external vibration measurement of transformers.
- The technical requirements for vibration sensors require a clear distinction between steady-state and transient technical conditions.

Date and Location of Last Working Group Meeting:
19th, October 2024, Nanjing, China (Third WG meeting)



- ◆ WG Chair Dr. Jun Deng introduce the Agenda, Minutes from Prior Meeting and IEEE Policies (include Call for Patents, copyright policy).
- ◆ Agenda and Minutes from Prior Meeting are approved by motion without opposition respectively.

- e) Attention to copyright issues in the layout diagram of vibration testing points.
- f) The case in Appendix C needs to be supplemented with the basic information of the tested equipment, vibration distribution, vibration signal extraction and analysis, etc.

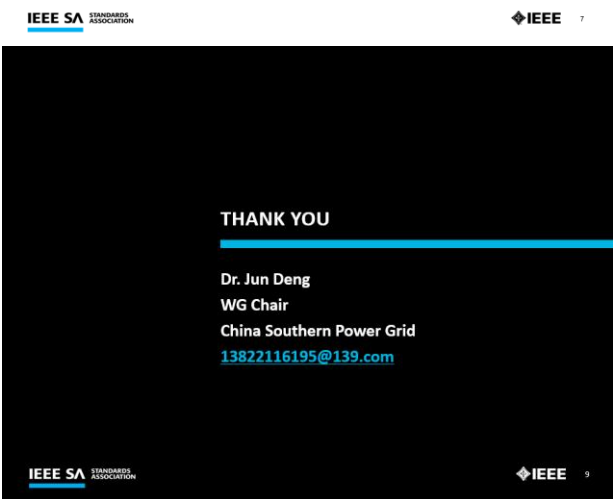
CURRENT STATUS OF WORKING GROUP

According to the comments of the last meeting (19th, October 2024 in Nanjing, China), the WG has made revisions to the draft and plans to hold the 4th WG meeting for discussion in the near future (April 2025, Nanchang, China). Besides, we plan to go to Sweden and discuss with ABB company this year (this autumn).

NEXT PLAN

■ Next WG Meeting

The next meeting is planned to be held at Nanchang China in April 2025.



Details of the WG see: <https://sagroups.ieee.org/57-132/>

Although no meeting has been reported, an updated draft has been reported. The SC chair asked back to the WG chair, how this draft was done without a meeting. There was no feedback prior to this meeting.

The SC shall stay involved in this WG. Participation in person would be possible in an expert function. However, the ballot will be organized according to the rules for such entity PAR's (one entity – one vote), but this SC has to agree that a draft proposed by the WG for balloting is in the required shape to start the ballot process.

E.5 Dual logo standard IEC/IEEE 60076-57-129 (WG Chair: Waldemar Ziomek)

In the time slot of the SC meeting, the WG held a meeting. Details can be found in the annex of these minutes.

E.6 Future Work of this Sub Committee

The chairman of the SC encouraged members and guest to propose work items and activities that shall be considered by this SC. Input is welcome – please contact the SC chairman directly.

E.7 Old Business

There was no old business

E.8 New Business

There were three items of new business.

First, an entity PAR proposal “Guide for arc test of liquid-Immersed High-Voltage Direct-Current (HVDC) converter transformers” sponsored by China was presented. The SC agreed to send questions regarding the need for this standard. Chris Ploetner will work together with the SC chair on a firm reply to the originator of the entity PAR proposal.

Second, an entity PAR proposal “Guide for General Technical Requirements and Test Methods for Valve Reactor in High Voltage Direct Current (HVDC) Transmission System using Line Commutated Converters (LCC) technology” sponsored by China was presented. The HVDC SC responded that this is not the appropriate SC for the work and referred it to Power Electronics. These reactors depend on the capabilities of the thyristors and associated valve design and are dependent on proprietary knowledge. Typically, these reactors are part of the overall thyristor valve design.

Third, an entity PAR proposal “Guide for composite current switching test of vacuum-type on load tap changer for converter transformer” by China was proposed for vacuum LTCs for Converter Transformers. After discussions with the former SC chair Ulf Radbrandt, the Sponsor agreed that this topic applies to all transformers. It will be referred back to the Transformers Committee.

E.9 Adjournment

The meeting was adjourned at 5:28pm.

Annex:

Minutes of Meeting of the WG meeting “Dual logo standard IEC/IEEE 60076-57-129” – March 23, 2025

Minutes of Meeting of the WG meeting “Dual logo standard IEC/IEEE 60076-57-129” – March 27&28, 2025

Minutes of Meeting

WG Rev. to IEEE Standard 60076-57-129 IEC/IEEE International Standard Power transformers-Part 57-129: Transformers for HVDC applications

March 24, 2025, 5:30 pm local time – Hyatt Regency Denver, Colorado

Chair: Waldemar Ziomek (wziomek@ptitransformers.com)

Secretary: Eric Davis (esetdavis@aol.com)

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

The meeting took place in the course of HVDC SC meeting. Thirteen (13) of thirty-three (33) members and sixteen (16) guests for a total of twenty-nine (29) people attended. Three (3) guests requested membership. A quorum was not in attendance. The list of attendees is shown below:

First Name	Last Name	Company	Member/ Guest
Anthony	Alexander	Hitachi Energy	G
Gilles	Bargone	FISO	G
Naveen	Bhardwaj	Trench Group	G
Camilo	Casallas	Trench Limited	M
David	Caverly	Trench Limited	G-RM
Vivian	Chan	Hitachi Energy	M
Marcos	Czernorucki	Hitachi Energy	M
Eric	Davis	Consultant	M
Evgenii	Ermakov	Hitachi Energy	M
Niklas	Gustavsson	Hitachi Energy	G
Didier	Hamoir	Transformer Protector Corporation	G
Peter	Heinzig	Weidmann Electrical Technology	M
Saif	Hossain	Trench Group	M
Reeve	Johnson	Hitachi Energy	G
Laszlo	Kadar	Laszlo & Associates	G-RM
Omar	Mendez	Prolec GE	M
Filip	Mikulecky	Koncar Power Transformers LTD	G
Anthony	Natale	HICO America	G
Marcelino	Perez	Prolec	G-RM
Christoph	Ploetner	Siemens Energy	M
Klaus	Pointner	Trench Austria GmbH	M
Bertrand	Poulin	Hitachi Energy	M
Adnan	Rashid	Measurement Canada	G
Michael	Sharp	Trench Limited	M
Christopher	Whitten	Hitachi Energy	G

First Name	Last Name	Company	Member/ Guest
Stefan	Wirth	Coil Innovation GmbH	G
Terry	Wong	Trench Canada Limited	M
Samuel	Young	Hitachi Energy	G
Waldemar	Ziomek	PTI Transformers	M

G: Guest

G-RM: Guest – Requesting Membership

M: Member

2. Agenda

The agenda for the WG meeting was presented by the WG chair.

3. Status Report as presented by the WG chair

The WG Chair:

- Reviewed the scheduled meetings for this fall
 - WG Meeting – Monday 3/24, 4:45 pm – 6:00 pm
 - WG Meeting/IEC – Thursday, 3/27, 1:00 pm – 5:00 pm
 - WG Meeting/IEC – Friday, 3/28, 8:00 am – 12:00 pm
- Reviewed the approved PAR Scope of Work
- Reviewed details of the existing revisions
 - Added explanation of LI and SI based on Insulation Coordination Studies.
 - Decided against adding a section on monitoring devices and systems.
 - Align definitions with IEC/IEEE 65700-19-03 Bushings for DC Applications.
 - Add LCC schemes in Annex A.
 - Discussed real and apparent power requirements.
 - The review of IEC Std 61378-3 Convertor Transformers Part 3: Application Guide identified only a few sections for inclusion in this document.
 - Discussed impacts of parallel AC and DC lines.
 - Proposed to remove Annex F Service Losses.
- Reviewed text regarding Active/Reactive Power
 - 5.2.6 Reactive Loading – Reviewed proposed text.
 - It was suggested that P-Q diagrams be added for LCC and VSC
- Reviewed text regarding LTC
 - There was discussion on defining overload as 1.2 pu in this document versus the current reference to other standards.
 - There was discussion on why a number of operations was included when referring to a high number of operations per year. This will be discussed on Thursday when a representative of an LTC Manufacturer is present.
- Reviewed the proposed timeline
 - First draft – F24

- First draft review and correction – S25
- Ballot within SC – F25
- Ballot Standard – S26
- Submit to RevCom – F26

The slides shown by the WG Chair will be posted to the website.

4. Old Business

There was no old business

5. New Business

There is no new business

6. Adjournment

The meeting was adjourned at 5:50pm.

Minutes of Meeting

WG Rev. to IEEE Standard 60076-57-129 IEC/IEEE International Standard Power transformers-Part 57-129: Transformers for HVDC applications

March 27, 2025, 1:00pm-4:30pm local time – Hyatt Regency Denver, Colorado, Mineral Hall DE

March 28, 2025, 8:15am-10:30am local time – Hyatt Regency Denver, Colorado, Mineral Hall DE

Chair: Waldemar Ziomek (wziomek@ptitransformers.com)

Secretary: Eric Davis (esetdavis@aol.com)

1. Welcome and Attendance

The WG held two additional meetings after the IEEE Transformer Committee meeting. These were meetings five and six of the WG. Eight (8) of thirty-three (33) members and eight (8) guests for a total of sixteen (16) people attended the meeting on Thursday. Five (5) of thirty-three (33) members and four (4) guests for a total of nine (9) people attended the meeting on Friday. Four (4) guests requested membership. A quorum was not achieved. The list of attendees is shown below by day:

First Name	Last Name	Company	Thursday 3/27	Friday 3/28	Member/ Guest
Patrycja	Jarosz	IEEE SA	X		G
Christoph	Ploetner	Siemens Energy	X	X	M
Bertrand	Poulin	Hitachi Energy	X		G
Marcos	Czernorucki	Hitachi Energy	X	X	M
Waldemar	Ziomek	PTI Transformers	X	X	M
Frank	Trautman	Siemens Energy	X	X	M
Sebastian	Rehkopf	Reinhausen Germany	X	X	G-RM
Laszlo	Kadar	Laszlo & Associates	X		G-RM
Klaus	Pointner	Trench Austria GmbH	X		M
Janusz	Szczechowski	Maschinenfabrik Reinhausen GmbH	X		G
KyungChan	An	Hyosung	X		G
Peter	Heinzig	Weidman	X		M
Vivian	Chan	Hitachi Energy	X		M
Abhishek	Jha	IEC / Hitachi Energy	X	X	G-RM
Jonathan	Walmsley	IEC	X	X	G-RM
Eric	Davis	Consultant	X	X	M
Kabir	Sethi	Hitachi Energy Germany Ag		X	G

G: Guest

G-RM: Guest – Requesting Membership

M: Member

2. Patent claims

IEEE Patent Policy Slides presented. There were no conflicts or patent claims.

3. Agenda

The agenda for the WG meeting was presented by the WG chair, including the agenda for fifth and sixth meeting of WG.

- Review comments received on:
 - Active & Reactive Loading
 - LTCs.
 - Other portions of the standard.

4. Status Report and Discussion

The following additions/edits/revisions to the HVDC transformer standard were discussed

- Reviewed active and reactive loading comments.
- Reviewed LTC comments.
- Reviewed LCC schemes details in Annex A
- Discussed real and apparent power requirements (P-Q tables or diagrams)

The following action items were assigned.

WG 60076-57 Action Item List

Section	Description	Assigned
	P-Q Diagrams	Marcos/Christoph
13.1 LTC	Impact of harmonic content (freq, mag) on LTC Operation - Check with Manufacturers	Sebastian
13.2 LTC	Recommendation on paragraph with # of operations (30,000)	Sebastian
Section 9.2.1	Agreed measurement at two frequencies is for type test only. Provide wording	Marcos
Section 9.21 Overexcitation	5% limit of differences, Background (defined in 12.90?)	Eric
Section 5.5 & 5.6 (both new)	Description of LCC and VSC Operation (Main body, annex)	Frank
Section 7.4	Wording of VSC Harmonic Calculations; total load losses due to harmonics Less than 5% no separate test	Jonathan
Annex A	Figure A.2 Direction of arrows Consistency in how all diagrams are shown	Frank
Annex A	Figure A.2, Delta-Star?	Frank
Annex A	Review all examples	Frank
Section 8.3.2.2, 9.3	Switching Impulse - Change?	Jonathan
	General Review and Comments	All

5. Old Business

There was no old business

6. New Business

There is no new business

7. Adjournment

The meeting was adjourned at 4:30pm on Thursday and 10:30am on Friday.