

## Annex F Instrument Transformers Subcommittee

**Chair:** Thomas Sizemore

**Vice Chair:** David Wallace

**Secretary:** Nigel MacDonald (unable to attend)

### F.1 Introductions

Attendees were requested to introduce themselves and provide affiliations at the time of the meeting.

The table below shows the recorded attendees, affiliations at the time of the meeting and roles in the ITSC. A total of 61 people were in attendance.

First Name	Last Name	Affiliation	Role
Carlos	Alonso	Arteche	Guest
Lee	Bigham	Instrument Transformer Equip Corp	Member
Sanket	Bolar	Oncor	Guest
Susan	Bonfiglio	WAPA	Guest
Lorin	Bratu	Trench Limited	Guest
Jeffery	Britton	Phenix Tech. Division of Doble Engineering	Guest
Chris	Brown	SDGE	Guest
Deniss	Carr	GE Grid Solutions	Member
Fidel	Castro	SDGE	Guest
Jaroslav	Chorzepa	ABB Inc.	Member
Fabiana	Cirino	OMICRON electronics Corp USA	Guest
Michael	Craven	Phoenix Engineering Services	Guest
Daniel	Crockett	Ameren	Guest
Juan Carlos	Cruz Valdes	Prolec GE	Guest
Huan	Dinh	Hitachi Energy	Member
Eric	Euvrard	RHM International	Member
Rob	Ghosh	GE	Member
Andrew	Gregory	ITEC	Guest
John	Herron	Raytech	Guest
Ryan	Hogg	Bureau of Reclamation	Member
Darren	Hoppins	Sensori Ink	Guest
Patryga	Jarosz	IEEE SA	Guest
Kurt	Kaineder	Siemens Energy	Guest
Will	Knapek	OMICRON electronics Corp USA	Member
Ivan	Konta	KONCAR - Instrument Transformers	Member
Mark	Lachman	Doble	Guest
Colby	Lovins	Federal Pacific	Guest
Luis	Machain	Prolec GE	Guest
Kornowski	Marek	Polycast	Member

Lee	Matthews	Consultant	Guest
James	McBride	JMX Services, Inc.	Guest
Scott	McCloskey	Amran	Member
Robert	Middleton	RHM International	Member
Randy	Mullikin	ABB Inc.	Member
Frank	Neder	Trebch Germany	Member
Stephen	Oakes	WEG Transformers USA Inc.	Member
Rudolf	Ogajanov	Hitachi Energy	Member
Jonas	Oliveira	Hitachi Energy	Guest
Dipakkumar	Patel	ITEC	Member
Caroline	Peterson	Xcel Energy	Member
Sylvain	Plante	Hydro Quebec	Guest
Adnan	Rashid	Measurement Canada / ISED	Member
Diego	Robalino	Megger	Member
Patrick	Rock	American Transmission Company	Member
Zoltan	Roman	GE Grid Solutions	Member
Andre	Rottenbacher	RITZ Usa	Member
Steven	Shull	BBC Electrical Services, Inc.	Guest
Thomas	Sizemore	ABB Inc.	Chair
Steven	Snyder	Hitachi Energy	Member
Muhammad Abdullah	Sohail	Trench Limited	Guest
William	Solano	Reinhausen	Member
Brian	Sonnenberg	Instrument Transformers, LLC	Member
Chris	Steineman	Delta Star Inc	Guest
Jacob	Thielbar	WAPA	Guest
Risto	Trifunoski	Trench Limited	Member
David	Wallace	Mississippi State University	Vice-Chair
David	Ward	ITEC	Guest
Barrett	Wimberly	GE Grid Solutions	Member
Malia	Zaman	IEEE	Guest
Peter	Zhao	Hydro One	Guest
Igor	Ziger	KONCAR - Instrument Transformers	Member

## F.2 Quorum

Quorum was met. 31 members were present while 22 were required. 30 guests were also in attendance. The total number of attendees was 61 and 4 requested memberships in the ITSC. These requests for membership will be reviewed.

## F.3 Agenda

An agenda was displayed by the chair. Rudy Ogajanov made a motion to approve which was seconded by Will Knapek. There were no objections to approving the agenda.

#### **F.4 Approval of minutes – Fall 2022 meeting**

Minutes were approved after a motion by Igor Ziger and a second by Pat Rock. There were no objections to approval.

#### **F.5 Essential Patent Claims & IEEE Copyright Policy**

A slide was displayed as a reminder to all WG/TF leaders that it is necessary to display the essential patent claim and IEEE copyright policy slides.

#### **F.6 Status of C57.13 Standards**

The chair briefly presented the status of the various standards handled by the ITSC including both those being actively worked on at this time as well as those not yet due for revision.

#### **F.7 Working Group Reports**

##### **F.7.1 JWG on Station Service Voltage Transformers, IEC-IEEE 63253-5713-8 – David Wallace & Ross McTaggart (unable to attend)**

This working group did not meet at the Transformers Committee meeting. However, it has been very active in comment resolution. The status of the comment resolution and latest balloting results were presented. It was indicated that a survey would be sent out to the WG members regarding a potential change. One of the voting countries wanted a change in the load power factor statement under clause 4.

##### **F.7.2.3 Working Group Instrument Transformer Requirements C57.13 – David Wallace**

**Attendees:** There was 61 total participants. 21 members (out of 32, quorum was met), 14 people requested membership (7 met criteria) and 1 member was moved to guest status.

<b>First Name</b>	<b>Last Name</b>	<b>Affiliation</b>	<b>Role</b>
Kayland	Adams	Protec GE Wohkesha	Guest
Carlos	Alonso	Arteche	Guest
Vivek	Bhatt	Prolec GE	Guest
Lee	Bigham	Instrument Transformer Equip Corp	Member
Sanket	Bolar	Oncor	Guest
Susan	Bonfiglio	WAPA	Guest
Lorin	Bratu	Trench Limited	Guest

Deniss	Carr	GE Grid Solutions	Member
Fabiana	Cirino	OMICRON electronics Corp USA	Guest
Daniel	Crockett	Ameren	Guest
Juan Carlos	Cruz Valdes	Prolec GE	Member
Huan	Dinh	Hitachi Energy	Member
Eric	Euvrard	RHM International	Member
Rob	Ghosh	GE	Guest
Michael	Gonzales	Southern California Edison	Guest
Andrew	Gregory	ITEC	Guest
Ravi	Gupta	Megger	Guest
John	Herron	Raytech	Guest
Ryan	Hogg	Bureau of Reclamation	Member
Derek	Hollrah	Burns & McDonnell	Guest
Darren	Hoppins	Sensori Ink	Guest
Kurt	Kaineder	Siemens Energy	Guest
Will	Knapek	OMICRON electronics Corp USA	Guest
Ivan	Konta	KONCAR - Instrument Transformers	Member
Luis	Machain	Prolec GE	Guest
Kornowski	Marek	Polycast	Guest
Lee	Matthews	Consultant	Guest
Scott	McCloskey	Amran	Guest
Robert	Middleton	RHM International	Member
Francis	Mills	Power Engineers	Guest
Randy	Mullikin	ABB Inc.	Guest
Frank	Neder	Trebbach Germany	Guest
Stephen	Oakes	WEG Transformers USA Inc.	Member
Rudolf	Ogajanov	Hitachi Energy	Guest
Jonas	Oliveira	Hitachi Energy	Member
Dipakkumar	Patel	ITEC	Guest
Caroline	Peterson	Xcel Energy	Guest
Sylvain	Plante	Hydro Quebec	Guest
Issack	Ramadan	AEP	Guest
Adnan	Rashid	Measurement Canada / ISED	Member
Patrick	Rock	American Transmission Company	Guest
Zoltan	Roman	GE Grid Solutions	Member
Andre	Rottenbacher	RITZ Usa	Guest
Thomas	Sizemore	ABB Inc.	Vice - Chair
Kenneth	Skinger		Guest
Steven	Snyder	Hitachi Energy	Member

Muhammad Abdullah	Sohail	Trench Limited	Member
William	Solano	Reinhausen	Guest
Brian	Sonnenberg	Instrument Transformers, LLC	Member
Chris	Steineman	Delta Star Inc	Guest
Charles	Sweetster	OMICRON electronics Corp USA	Member
Samuel	Tekle	WEG Transformers USA Inc.	Guest
Jacob	Thielbar	WAPA	Guest
Scott	Thomas	Hitachi Energy	Guest
Risto	Trifunoski	Trench Limited	Member
Cody	Vanwyck	Commonwealth Associates	Guest
Mike	Waldrop	MLGW	Guest
David	Wallace	Mississippi State University	Chair
David	Ward	ITEC	Guest
Barrett	Wimberly	GE Grid Solutions	Member
Igor	Ziger	KONCAR - Instrument Transformers	Secretary

**Essential Patent Claims:** Text was displayed, and the Chair inquired as to if anyone knew of essential patent claims. None were brought up.

**Copyright:** Text was displayed at the meeting

**Agenda:** The agenda was presented to the WG. Agenda Approval: 1<sup>st</sup> Barret Wimberly, 2<sup>nd</sup> Rudy Ogajanov. No objections.

**Minutes:** The minuets from the Fall 2022 meeting were presented. Minutes approval: 1<sup>st</sup> Steve Oakes, 2<sup>nd</sup> Huan Dinh. No objections

### **Resolution of comments on Draft 0 starting at #21:**

17 comments were reviewed

The main comments / discussion points from the comment resolution are given below:  
HW Assignments:

- Comment 21 (Thomas and Randy) - Already working on it.
- Comment 23 (Igor) - Compare altitude clause with IEC 60137
- Comment 28 (Randy) -Extend the curves and write up additional language
- Comment 29 (Not really specified) - Compare the Power frequency requirements with the bushing standard before removing the column
- Comment 30 (Zoltan) - Add Text on 1550 kV voltage level and the findings on it
- Comment 33 (Randy) - Align Um with different standards

- Comment 34 (David and Igor) - See options for a new layout (compare and coordinate with CCVT standard)

- Comment 36 (Igor) - Update the table with the creepage distance according to the SSVT Standard.

David will send out a survey to the workgroup to schedule web meetings in the upcoming months to get through all the comments.

Thomas Sizemore presented that work has been started on creating a section for VT/CT combination units and asked for additional people to review, comment and modify the document that has been started. 12 additional people have volunteered to work on this effort.

**Motion to adjourn:** A motion was put forth by 1<sup>st</sup> Barret Wimberly and 2<sup>nd</sup> by Rudy Ogajanov.

**Next Meeting:** This WG will meet to continue work at the Kansas City, KS USA, Fall 2023 meeting.

#### F.7.5 TF for Instrument Transformers Accuracy – Igor Ziger

**Attendees:** The number of participants was 48. 23 members present and quorum was obtained. Paper rosters / sign-in sheets were circulated. 4 people requested membership which will be reviewed.

First Name	Last Name	Affiliation	Role
Carlos	Alonso	Arteche	Guest
Lee	Bigham	Instrument Transformer Equip Corp	Member
Susan	Bonfoglio	WAPA	Guest
Lorin	Bratu	Trench Limited	Guest
Jaroslav	Chorzepa	ABB Inc.	Member
Fabiana	Cirino	OMICRON electronics Corp USA	Guest
Michael	Craven	Qualus Corp.	Guest
Daniel	Crockett	Ameren	Guest
Gabriel	Delgado	Invenergy	Guest
Huan	Dinh	Hitachi Energy	Member
Rob	Ghosh	General Electric	Guest
Andrew	Gregory	ITEC	Guest
Ryan	Hogg	Bureau of Reclamation	Member
Darren	Hoppins	Sensori Ink	Guest
Lidija	Ivanic	Siemens Energy	Guest
Ivan	Konta	KONCAR - Instrument Transformers	Member
Marek	Kornowski	Polycast International	Member
Colby	Lovins	Federal Pacific	Guest

Luis	Machain	Prolec GE	Guest
Lee	Matthews	Howard Industries	Guest
Scott	McCloskey	Amran Inc.	Member
Robert	Middleton	RHM International	Member
Randolph	Mullikin	ABB Inc.	Member
Frank	Neder	Trench Germany GmbH	Member
Stephen	Oakes	WEG Transformers USA Inc.	Guest
Rudolf	Ogajanov	ABB Inc.	Member
Jonas	Oliveira	Hitachi Energy	Vice-Chair
Dipakkumar	Patel	Instrument Transformer Equip Corp	Member
Igor	Peršinec	Siemens Energy	Guest
Caroline	Peterson	Xcel Energy	Member
Goran	Plišić	Siemens Energy	Guest
Adnan	Rashid	Measurement Canada / ISED	Member
Diego	Robalino	Megger	Guest
Patrick	Rock	American Transmission Co.	Guest
Zoltan	Roman	GE Grid Solutions	Member
Andre	Rottenbacher	Ritz Instrument Transformers	Guest
Thomas	Sizemore	ABB Inc.	Member
Steven	Snyder	Hitachi Energy	Guest
Muhammad Abdullah	Sohail	Trench Limited	Guest
Brian	Sonnenberg	Instrument Transformers, LLC	Member
Chris	Steineman	Delta Star Inc	Guest
Charles	Sweetser	OMICRON electronics Corp USA	Guest
Risto	Trifunski	Trench Limited	Member
Deniss	Villagran	GE Grid Solutions	Member
David	Wallace	Mississippi State University	Member
David	Ward	ITEC	Guest
Barrett	Wimberly	GE Grid Solutions	Member
Igor	Ziger	KONCAR - Instrument Transformers	Chair

**Essential Patent Claims:** Text was displayed, and the Chair inquired as to if anyone knew of essential patent claims. None were brought up.

**Copyright:** Text was displayed at the meeting

**Minutes of pervious meeting:** Unanimously approved with motion brought forward by Thomas Sizemore and seconded by Scott McCloskey.

**Agenda:** Unanimously approved with motion brought forward by David Wallace and seconded by Rudolf Ogajanov.

**Review of the action items for this task force:**

### **Information on TF Officers**

- J. Oliveira was officially announced as the co-chair of the taskforce.

### **Resolution of comments gathered on the Extended Range Clause**

- 3 out of 5 comments were addressed and resolved.
- The majority of the meeting was dedicated on a lengthy discussion over the recommended values for extended range and whether the extended range should be limited on the lower end.
- There were multiple contributions from various members and different aspects were discussed in detail.

### **The main action items that were the result of the lengthy discussion are as follows:**

- It was agreed to add explanatory text for bushing type CTs
- It was agreed to keep recommended ratios and add recommended extended range
- A motion was passed to vote whether to use separate accuracy class designation for extended range or to use the existing accuracy class designations. The exact motion was brought forward to by S. McCloskey and seconded by R.Hogg. The motion was for having dedicated ER accuracy classes as proposed in the document. The motion was passed with 19 votes for, 2 against and 1 abstained.

The other approach will be removed from the revised document.

2 comments were left unresolved. An interim meeting should be held to resolve the remaining comments and integrate all agreed points into the text.

All material showcased will be posted on the committee website.

**Motion to adjourn:** A motion was put forth by D. Wallace and seconded by T. Sizemore

**Next Meeting:** This WG will meet to continue work at the Kansas City, MO Fall 2023 meeting.

### **F.7.6 WG for PLC capacitors and Coupling Capacitor Voltage Transformers (C57.13.9) – Zoltan Roman**

The Working Group Chair, Zoltan Roman, started the meeting with Mike Craven as Secretary and introductions were made.

**Attendees:** The number of participants was 31. 15 members present and quorum was



obtained. Additionally, 16 guests were present. Paper rosters / sign-in sheets were circulated.

<b>First Name</b>	<b>Last Name</b>	<b>Company</b>	<b>Role</b>
Zoltan	Roman	GE Grid Solutions	Chair
Carlos	Alonso	Arteche	Guest
Lorin	Bratu	Trench	Guest
Fabiana	Cirino	OMICRON	Guest
Daniel	Crockett	Ameren	Guest
Huan	Dinh	Hitachi Energy	Guest
Andrew	Gregory	ITEC	Guest
Kurt	Kaineder	Siemens Energy	Guest
Will	Kknapek	OMICRON	Guest
Scott	McCloskey	Amran Inc.	Guest
Frank	Neder	Trench Germany GmbH	Guest
Rudolf	Ogajanov	ABB Inc.	Guest
Jonas	Oliveira	Hitachi Energy	Guest
Dipakkumar	Patel	Instrument Transformer Equip Corp	Guest
Muhammad Abdullah	Sohail	Trench Limited	Guest
Christopher	Steineman	Delta Star Inc.	Guest
David	Ward	ITEC	Guest
Ivan	Konta	KONCAR - Instrument Transformers	Member
Robert	Middleton	RHM International	Member
Caroline	Peterson	Xcel Energy	Member
Adnan	Rashid	Measurement Canada / ISED	Member
Patrick	Rock	American Transmission Co.	Member
Andre	Rottenbacher	Ritz Instrument Transformers	Member
Thomas	Sizemore	ABB Inc.	Member
Steven	Snyder	Hitachi Energy	Member
Risto	Trifunoski	Trench Limited	Member
Deniss	Villagran	GE Grid Solutions	Member
David	Wallace	Mississippi State University	Member
Barrett	Wimberly	GE Grid Solutions	Member

Igor	Ziger	KONCAR - Instrument Transformers	Member
Michael	Craven	Qualus Power Services	Secretary

**Essential Patent Claims:** Text was displayed, and the Chair inquired as to if anyone knew of essential patent claims. None were brought up.

**Copyright:** Text was displayed at the meeting

**Minutes of pervious meeting:** Unanimously approved with motion brought forward by Barrett Wimberly and seconded by Pat Rock.

**Agenda: The agenda was presented.** Unanimous approval was granted with motion brought forward by Thomas Sizemore and seconded by David Wallace.

Zoltan reviewed the status of the Comment Resolution Group (CRG), the Web meeting membership and asked for volunteers to do the editorial comment revisions. Also, after a brief discussion it was decided to request another one-year PAR extension.

Starting at about 8:15 Zoltan started to discuss and resolve items that were deferred for this in-person meeting. Record 507 was ACCEPTED after discussion. Related to that, Zoltan commented on his IEC work and that they wanted to use Table 13 Transient Response Classes from Section 7.3.

A couple more line items were dealt with until record 515 led to much discussion about metering versus protection application by class. Time ran out; the issue could not be resolved in this meeting.

Dave Wallace, Thomas Sizemore, Mike Craven and Andre Rottenbacher volunteered to help with editorial comment resolution.

**Motion to adjourn:** The meeting adjourned at 9:15 with no objections

**Next Meeting:** This WG will meet to continue work at the Kansas City, MO Fall 2023 meeting.

## F.8 Old Business

Discussion on Taskforce to incorporate C57.13.5 into C57.13:

18 volunteers signed up for the taskforce. Zoltan Roman, Steve Snyder and Huan Dinh worked between meetings. 5 virtual meeting were held. The taskforce and the initial goal of the team were not recorded in the minutes of the last meeting and some discussion was needed at this meeting.

The primary focus was should we incorporate the entirety of C57.13.5 in C57.13 or just portions. Huan Dinh presented and led the discussion. Listed the pros and cons of

performing this merger along with an alternative of just transferring material that is missing from the current draft of C57.13.

- Listed the technical differences between the two standards: PD and Power frequency voltage withstand
- Different procedures: Routine test with vs without impulse test
- Impulse type test
- Additional tests for C57.13: on both routine and type test

Huan discussed a spreadsheet showing significant differences between the two standards. Igor discussed the difference between class 1 and class 2, how do you decided which one to use. He feels that 115kV and above should be class 2 and follow C57.13.5.

Rudy discussed the customers using the standards and they do not specify either Class 1 or 2 but rather which standard to use. He feels we do not need to merge the standards.

Steve Snyder suggested that the units are not built differently based on the class but only different test sequences.

Ryan Hogg discussed what “class” brings up when doing a search for transformers. He feels that the word class should be removed.

Marek Koronoski feels that the standard will become too large and overshadow the low voltage class units. He would like to keep the standards separate. Zolton Roman did not see a problem with overshadowing.

Zolton Roman motioned to join the two standards and let C57.13.5 expire and Pat Rock seconded the motion. Options on the vote were as displayed below.

1. Completely consolidate C57.13.5 into C57.13
2. Update C57.13 with new material from C57.13.5
3. Keep them separated and referring to each other on related material as is.

Vote was held. 17 voted for the motion, 10 voted against and 3 abstained.

## **F.9 New Business**

Kurt Kainider and Frank Neder discussed status on electronic instrument transformers. Digital substation, Low burden, power quality, Low Power ITs were discussed. Examples were shown of electronic CT assembly and optical CT assemblies. A list was provided of IEC standards currently in place and under consideration. Both presenters requested adding this information into the C57.13 family of standards. Huan Dinh suggested bringing in elements from IEC into the std. Jim McBride discussed the work being done by PSIM. Minimal discussion took place due to time limitations this discussion may be continued at the Fall meeting.

## **F.10 ITSC Adjournment**

The meeting concluded and was adjourned after a motion by Pat Rock and seconded by Rudy Ogajanov at approximately 9:15 AM.

The next meeting is to be held in Kansas City, Missouri, USA, in the Spring of 2023.