

Annex F Instrument Transformers Subcommittee

Chair: Thomas Sizemore

Vice Chair: David Wallace

Secretary: Nigel MacDonald

F.1 Introductions

In lieu of introduction all attendees were encouraged to enter their name and affiliation in the chat function. This was done primarily to save time as this meeting was expected to last most of the allotted time.

The table below shows all recorded attendees, affiliations at the time of the meeting and roles in the ITSC.

Israel	Barrientos	Prolec GE	Guest
Lee	Bigham	Instrument Transformer Equip Corp	Member
Randy	Brannen	Southern Company Services	Member
Jeffrey	Britton	Phenix Technologies, Inc.	Guest
Steven	Brzoznowski	Bonneville Power Administration	Member
Jagdish	Burde	Virginia Transformer Corp	Guest
Jaroslav	Chorzepa	ABB Inc.	Member
Michael	Craven	Phoenix Engineering Services	Guest
Juan Carlos	Cruz Valdes	Prolec GE	Guest
Sami	Debass	Electric Power Research Institute (EPRI)	Guest
Rolando	Demes	Arteche	Member
Brandon	Dent	Memphis Light, Gas & Water	Guest
Huan	Dinh	Hitachi Energy	Member
Daniela	Ember Baciu	Hydro-Quebec IREQ	Guest
Eric	Euvrard	RHM International	Member
Feras	Fattal	Manitoba Hydro	Member
Reto	Fausch	RF Solutions	Guest
Dora	Gazivoda	KONCAR - Instrument Transformers	Guest
Rob	Ghosh	General Electric	Member
Andrea	Glynn	Xcel Energy	Guest
Michael	Gonzales	Southern California Edison	Guest
Michael	Haas	Instrument Transformers, LLC	Guest
Ryan	Hogg	Bureau of Reclamation	Guest
Ramadan	Issack	American Electric Power	Guest
Ivan	Konta	KONCAR - Instrument Transformers	Member
Marek	Kornowski	Polycast International	Member
Deepak	Kumaria	Applied Materials	Member

Xose	Lopez-Fernandez	Universidade de Vigo	Guest
Colby	Lovins	Federal Pacific	Guest
Nigel	Macdonald	Trench Limited	Secretary
Lee	Matthews	Howard Industries	Guest
James	McBride	JMX Services, Inc.	Guest
Scott	McCloskey	Amran Inc.	Member
Matthew	McFadden	Oncor Electric Delivery	Guest
Ross	McTaggart	Trench Limited	Member
Randolph	Mullikin	ABB Inc.	Member
Frank	Neder	Trench Germany GmbH	Member
Livia	Neeson	Entergy	Guest
Thomas	Nelson	NIST	Guest
Stephen	Oakes	WEG Transformers USA Inc.	Member
Rudolf	Ogajanov	ABB Inc.	Member
Sanjay	Patel	Smit Transformer	Guest
Dipakkumar	Patel	Instrument Transformer Equip Corp	Member
Caroline	Peterson	Xcel Energy	Member
Pierre	Riffon	Pierre Riffon Consultant Inc.	Member
Diego	Robalino	Megger	Member
Patrick	Rock	American Transmission Co.	Member
Zoltan	Roman	GE Grid Solutions	Member
Andre	Rottenbacher	Ritz Instrument Transformers	Member
Daniel	Sauer	EATON Corporation	Guest
Devki	Sharma	Entergy	Guest
Stephen	Shull	BBC Electrical Services, Inc.	Guest
Thomas	Sizemore	ABB Inc.	Chair
Edward	Smith	H-J Family of Companies	Guest
Steven	Snyder	Hitachi Energy	Member
William	Solano	Instrument Transformer Equip Corp	Member
Brian	Sonnenberg	Instrument Transformers, LLC	Member
Mauricio	Soto	Hitachi Energy	Guest
Katrina	Swanson McLeod	Southern Nuclear	Guest
Janusz	Szczechowski	Maschinenfabrik Reinhausen	Guest
Dervis	Tekin	Meramec Instrument Transformer Co.	Member
Eric	Theisen	Metglas, Inc.	Guest
Reza	Torabi Goodarzi	SMIT Transformatoren B.V.	Guest
Risto	Trifunoski	Trench Limited	Member
Kiran	Vedante	Ritz Instrument Transformers	Member

Deniss	Villagran	GE Grid Solutions	Member
Dieter	Wagner	Hydro One	Guest
Hugh	Waldrop	Memphis Light, Gas & Water	Guest
David	Wallace	Mississippi State University	Vice-Chair
Peter	Werelius	Megger	Guest
Mana	Yazdani	Trench Limited	Member
Malia	Zaman	IEEE	Guest
Kris	Zibert	Allgeier, Martin and Associates	Guest
Igor	Ziger	KONCAR - Instrument Transformers	Member

F.2 Quorum

37 of 42 members were present and quorum was attained. 37 guests were also in attendance. The total number of attendees was 74 and 6 requested membership. These requests for membership will be reviewed.

F.3 Agenda

An agenda was displayed by the chair. It was approved unanimously after a motion by Marek Kornowski and seconded by Deepak Kumaria.

F.4 Approval of minutes – Spring 2021 meeting

Minutes were approved unanimously after a motion by Deepak Kumaria and seconded by Rob Ghosh.

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

Attendees: 52 people attended the meeting with 25 members present. Quorum was met. 2 people requested membership to the working group.

The table below shows all recorded attendees, affiliations at the time of the meeting and roles in this working group.

Stephen	Anthony	--	Guest
Allan	Bartek	Spruce Run Engineering LLC	Guest
Lee	Bigham	Instrument Transformer Equip Corp	Member
Randy	Brannen	Southern Company Services	Member
Steven	Brzoznowski	Bonneville Power Administration	Member
Jaroslav	Chorzepa	ABB Inc.	Guest
Michael	Craven	Phoenix Engineering Services	Guest
Rolando	Demes	Arteche	Member
Brandon	Dent	Memphis Light, Gas & Water	Guest
Huan	Dinh	Hitachi Energy	Member
Feras	Fattal	Manitoba Hydro	Guest
Dora	Gazivoda	KONCAR - Instrument Transformers	Guest
Kurt	Kaineder	Siemens Energy	Guest
Ivan	Konta	KONCAR - Instrument Transformers	Guest
Deepak	Kumaria	Applied Materials	Member
Nigel	Macdonald	Trench Limited	Member
James	McBride	JMX Services, Inc.	Member
Scott	McCloskey	Amran Inc.	Guest
Ross	McTaggart	Trench Limited	Vice-Chair
Frank	Neder	Trench Germany GmbH	Member
Stephen	Oakes	WEG Transformers USA Inc.	Member
Rudolf	Ogajanov	ABB Inc.	Member
Dipakkumar	Patel	Instrument Transformer Equip Corp	Guest
Caroline	Peterson	Xcel Energy	Member
Sylvain	Plante	Hydro-Quebec	Guest
Michael	Richardson	Ameren	Guest
Pierre	Riffon	Pierre Riffon Consultant Inc.	Member
Patrick	Rock	American Transmission Co.	Member
Zoltan	Roman	GE Grid Solutions	Member
Andre	Rottenbacher	Ritz Instrument Transformers	Guest
Eric	Schleismann	Southern Company Services	Guest
Devki	Sharma	Entergy	Member
Thomas	Sizemore	ABB Inc.	Member
Kenneth	Skinger	Scituate Consulting, Inc.	Vice-Chair
Steven	Snyder	Hitachi Energy	Member
William	Solano	Instrument Transformer Equip Corp	Member
Mike	Spurlock	Spurlock Engineering Services, LLC	Guest

Kyle	Stechschulte	American Electric Power	Guest
Dervis	Tekin	Meramec Instrument Transformer Co.	Member
Risto	Trifunoski	Trench Limited	Guest
Kiran	Vedante	Ritz Instrument Transformers	Member
Deniss	Villagran	GE Grid Solutions	Member
Dieter	Wagner	Hydro One	Guest
David	Wallace	Mississippi State University	Chair
Barrett	Wimberly	GE Grid Solutions	Member
Mana	Yazdani	Trench Limited	Member
Malia	Zaman	IEEE	Guest
Kris	Zibert	Allgeier, Martin and Associates	Guest
Igor	Ziger	KONCAR - Instrument Transformers	Member

Essential Patent Claims: Was discussed by the Chair. The membership was inquired as to if anyone knew of essential patent claims. None were brought up.

IEEE Copyright Policy: Was discussed by the Chair.

Agenda: The agenda was displayed by the Chair. Kenneth Skinger made a motion to approve the minuets and Deepak Kumaria seconded the motion. The agenda was approved with no objections made.

Minutes: Minutes of the Spring 2021 Virtual meeting were presented. Pierre Riffon made a motion to accept the minuets and Deepak Kumaria seconded the motion. The minuets were approved by the members of the working group with no objections.

David Wallace pointed out that a request for a par extension had been submitted.

Ross McTaggart led a discussion on the status of the latest revision of the draft and presented the timeline for submittal to IEC and IEEE.

Pierre Riffon brought up a question concerning what happens if IEC or IEEE disagree on the draft. A thorough discussion was held and it was decided to address it with Malia and IEEE.

David Wallace agreed to post the latest version of the draft to the website and send it to the WG.

Igor Ziger made a motion to adjourn the meeting, Deepak Kumaria seconded the motion. No objections were made.

The meeting was adjourned at 8:55 am.

Next Meeting: The WG will meet to continue work at the Spring 2022 meeting in Denver, Co.

F.7.2.3 Working Group for PLC Capacitors and CCVT's C57.13.9 – Zoltan Roman

Minutes from the November 16, 2021 Webex meeting at an 11:50 (USA Eastern time) session of the Fall Transformers Committee meeting.

The Working Group Chair, Zoltan Roman, started the meeting with Mike Craven as Secretary and introductions were made. Deepak Kumaria made the motion to approve the Agenda which Zoltan presented, and Dave Wallace seconded it. There were no comments or objections. A membership poll was done and there were 19 members present and only 13 needed. There was a quorum therefore the Agenda was approved.

Overall, there were 41 WG attendees with 20 members present when attendance was checked.

The table below shows all recorded attendees, affiliations at the time of the meeting and roles in this working group.

Stephen	Ashcraft	Hitachi Energy	Member
Olle	Benzler	Megger	Guest
Sanket	Bolar	Megger	Guest
Randy	Brannen	Southern Company Services	Member
Jaroslav	Chorzepa	ABB Inc.	Guest
Michael	Craven	Phoenix Engineering Services	Secretary
Rolando	Demes	Arteche	Member
David	Ellis	PSEG	Guest
Feras	Fattal	Manitoba Hydro	Guest
Lorne	Gara	Shermco	Guest
Dora	Gazivoda	KONCAR - Instrument Transformers	Guest
Andrea	Glynn	Xcel Energy	Guest
Ivan	Konta	KONCAR - Instrument Transformers	Member
Deepak	Kumaria	Applied Materials	Member
Nigel	Macdonald	Trench Limited	Member
Scott	McCloskey	Amran Inc.	Guest
Matthew	McFadden	Oncor Electric Delivery	Guest
Ross	McTaggart	Trench Limited	Member
Livia	Neeson	Entergy	Guest
Kristopher	Neild	Megger	Guest
Rudolf	Ogajanov	ABB Inc.	Guest
Dipakkumar	Patel	Instrument Transformer Equip Corp	Guest
Caroline	Peterson	Xcel Energy	Member
Diego	Robalino	Megger	Member
Patrick	Rock	American Transmission Co.	Member
Zoltan	Roman	GE Grid Solutions	Chair
Andre	Rottenbacher	Ritz Instrument Transformers	Member
Devki	Sharma	Entergy	Guest
Stephen	Shull	BBC Electrical Services, Inc.	Guest
Thomas	Sizemore	ABB Inc.	Member

Muhammad Abdullah	Sohail	Trench Limited	Guest
Dervis	Tekin	Meramec Instrument Transformer Co.	Member
Risto	Trifunoski	Trench Limited	Guest
Kiran	Vedante	Ritz Instrument Transformers	Guest
Deniss	Villagran	GE Grid Solutions	Member
David	Wallace	Mississippi State University	Member
Peter	Werelius	Megger	Guest
Barrett	Wimberly	GE Grid Solutions	Member
Mana	Yazdani	Trench Limited	Member
Shibao	Zhang	PCORE Electric	Guest
Igor	Ziger	KONCAR - Instrument Transformers	Member

The patent notice was made and there were no patent claims. Attendees were notified of the copyright Policy.

The motion to approve all of the last four meeting's minutes was made by Diego Robalino and seconded by Deepak Kumaria. There were no objections, and they all are approved.

Zoltan reviewed the history of the WG and went on to also review the status of the standard explaining the PAR extension and need for the PSCC vote in January 2022.

The main new business started with Zoltan's review and minor changes to 6.5 RIV Table 9, Table 15 and Figure 3 in 7.12. which was a copy from the original C93.4 standard. The question of usage and copyright came up and will be rechecked. Minor changes continued with 8.3.10 and checks of Figures C2, 3 and 4. 9.5.1 was revised and 9.5.2 was similar. All of these resulted in no further comments and implicit acceptance. The definition of "return loss" and Figure A1 were also copied from C93.4.

C4.1 "Ratio measurement..." led to the polarity discussion left from the last meeting. Volunteers hadn't been able to do tests and make recommendations. This led to new polarity language in C4.1 and resolved with no further comments. Also, in C4.1 was "Define the uncertainty" and Zoltan presented Diego's email with investigation of different manufacturer's equipment accuracy and a long discussion of what numbers to cite. Eventually the clarification was added "...0.5% or lower uncertainty for the ratio measurement."

At this point, Zoltan said the Draft 15 appears final and asks if it should be released for balloting. Pat Rock made the motion to release it for balloting and Diego Robalino seconded it. No one had anything for discussion and a poll was requested. The motion passed.

There was some discussion of the steps for the standard's procedure and Zoltan will look to form a ballot resolution group. The next meeting will be in Denver during the TC meeting March 27 – 31, 2022.

The motion to adjourn the meeting passed at 13:17.

F.7.5 TF for Instrument Transformers Accuracy – Igor Ziger

Attendees: A total of 56 people attended the meeting of which 26 were members and a quorum was obtained. The status of those requesting membership will be determined between meetings.

The table below shows all recorded attendees, affiliations at the time of the meeting and roles in this task force.

Stephen	Ashcraft	Hitachi Energy	Guest
Israel	Barrientos	Prolec GE	Guest
Allan	Bartek	Spruce Run Engineering LLC	Guest
Olle	Benzler	Megger	Guest
Lee	Bigham	Instrument Transformer Equip Corp	Member
Jaroslav	Chorzepa	ABB Inc.	Guest
Michael	Craven	Phoenix Engineering Services	Guest
Rolando	Demes	Arteche	Guest
Huan	Dinh	Hitachi Energy	Member
David	Ellis	PSEG	Member
Wayne	Ellis	Memphis Light, Gas & Water	Guest
Feras	Fattal	Manitoba Hydro	Member
Dora	Gazivoda	KONCAR - Instrument Transformers	Guest
Rob	Ghosh	General Electric	Guest
Andrea	Glynn	Xcel Energy	Guest
Michael	Haas	Instrument Transformers, LLC	Guest
Ryan	Hogg	Bureau of Reclamation	Guest
Kurt	Kaineder	Siemens Energy	Member
Ivan	Konta	KONCAR - Instrument Transformers	Member
Marek	Kornowski	Polycast International	Member
Deepak	Kumaria	Applied Materials	Vice-Chair
Colby	Lovins	Federal Pacific	Member
Nigel	Macdonald	Trench Limited	Member
James	McBride	JMX Services, Inc.	Guest
Scott	McCloskey	Amran Inc.	Member
Ross	McTaggart	Trench Limited	Member
Randolph	Mullikin	ABB Inc.	Guest
Frank	Neder	Trench Germany GmbH	Member
Livia	Neeson	Entergy	Guest
Thomas	Nelson	NIST	Guest
Stephen	Oakes	WEG Transformers USA Inc.	Guest
Rudolf	Ogajanov	ABB Inc.	Member
Dipakkumar	Patel	Instrument Transformer Equip Corp	Member
Caroline	Peterson	Xcel Energy	Member
Sylvain	Plante	Hydro-Quebec	Member

Pierre	Riffon	Pierre Riffon Consultant Inc.	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
Muhammad Abdullah	Sohail	Trench Limited	Guest
William	Solano	Instrument Transformer Equip Corp	Member
Brian	Sonnenberg	Instrument Transformers, LLC	Member
Dervis	Tekin	Meramec Instrument Transformer Co.	Member
Risto	Trifunoski	Trench Limited	Member
Cole	Van Dreel	American Transmission Co.	Guest
Kiran	Vedante	Ritz Instrument Transformers	Member
Deniss	Villagran	GE Grid Solutions	Member
Dieter	Wagner	Hydro One	Guest
David	Wallace	Mississippi State University	Member
Peter	Werelius	Megger	Guest
William	Whitehead	H2scan Corporation	Guest
Mana	Yazdani	Trench Limited	Member
Peter	Zhao	Hydro One	Guest
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 David Wallace and seconded by Sylvan Plante.

Agenda: Unanimously approved with motion brought forward by Pierre Riffon and seconded by David Wallace

Review of the action items for this task force:

Report on activities within the Sub Taskforce – Investigation of burdens at amperage other than 5 amps

The minutes and material from the Sub Taskforce – Investigation of burdens at amperage other than 5 amps was reported on and shown (after being circulated to the TF body the previous day)

The minutes from both virtual meetings held on 14th and 28th of July 2021 were approved. The motion was brought forward by Thomas Sizemore and seconded by Deepak Kumaria.

All materials from the sub-TF will be posted on the committee website

Presentation of the initial variant of Annex A regarding calculation of VT RCF and phase error from measured values at different PF and burdens

Thomas Sizemore presented and read through the initial proposal of the new “Annex A”, which was drafted by Hossein Nabi-Bidhendi. Thomas also provided some examples of when customers required information that is enabled by this calculation procedure (adding additional burden due to ferro-resonance, having burden power factors different from those required by the standard...)

Participants were encouraged to try out the method

The initial variant of the Annex A along with the presentation from the spring meeting will be sent out to the TF body

Presentation of the application of the method on different high-voltage units

Igor Ziger gave a presentation on the application method to different HV units using test data retroactively

There was a discussion on application of the method when the supply voltage is not completely sinusoidal. This was brought forward by D. Ellis and was concluded that the method (and regular accuracy measurements) are applicable only when the supply voltage is sinusoidal or as close to that as possible

A question was raised by R. Ogajanov on whether the method can be used to guarantee revenue metering accuracy performance. After a brief discussion it was concluded that, based on experiences with different units, it can be used to guarantee revenue metering accuracy performance, provided that the considered burdens are lower than the burden measurements were performed on.

It was discussed that this method is not applicable to CTs

Participants were again encouraged to try out the method. Z. Roman volunteered to try out the method.

New business: “Extended Range” CTs

I. Ziger briefly presented the background on extended range CTs and experiences from different customers and markets.

There was a brief discussion on the topic, shortened due to a lack of time, and it was concluded that this will be made a new business item. The motion was brought forward by Rob Ghosh and seconded by William Solano.

Motion to adjourn: A motion was put forth by Deepak Kumaria and seconded by Thomas Sizemore.

Next Meeting: This WG will meet to continue work at the Denver, Colorado USA, Spring 2022 meeting.

F.8 Old Business

No old business was displayed or discussed.

F.9 New Business

The creation of a new working group for the revision of C57.13 was discussed. It was approved unanimously after a brief discussion. A motion to approve was given by Steve Snyder and seconded by Igor Ziger. Whether to use a traditional or continuous revision type PAR was discussed for several minutes. Comments were provided by Zoltan Roman, Steve Snyder and Igor Ziger. Some questions were raised about the continuous revision process and Steve Shull provided answers to those questions. Ultimately it was decided to pursue a traditional PAR for this working group. This was followed a unanimous approval. David Wallace and Igor Ziger were introduced as officers for the working group.

Zoltan Roman presented the results of the C57.13.9 meeting. This working group had recommended that the ITSC consider if this standard could now recommend beginning the balloting stage. After a brief discussion a motion was approved unanimously after a motion by Zoltan Roman in the ITSC for the standard to be moved into the balloting phase.

Thomas Sizemore presented that the ITSC has been approached about a guide being developed in China. They are developing a document tentatively titled "Guide for live line calibrator of current transformer in distribution network". The proposed scope was also presented. A request was made that members of the ITSC consider acting as a liaison between this working group and the ITSC. It was noted that the liaison, Steve Shull and Thomas Sizemore will meet to recommend changes to the title and scope.

Jim McBride brought up the possibility of having a presentation regarding instrument transformer and how they are affected by breaker interactions. Zoltan Roman, Pierre Riffon, Deepak Kumaria and Thomas Sizemore provided additional comments. A presentation was proposed on the topic. This topic will be discussed further before the Spring meeting to determine scope, materials to be presented, etc.

F.10 ITSC Adjournment

The meeting concluded after a motion to adjourn was put forward by Diego Robalino and seconded by Deepak Kumaria which was approved unanimously.

The next meeting is to be held in Denver, Colorado, USA, in the Spring of 2022.