Standards Subcommittee

October 25 2023, Kansas City, MO

Standards Subcommittee		
Chair: Daniel Sauer	**Vice-Chair: Marcos Ferreira**	**Secretary: Ajith Varghese**
Standards Coordinator: Steve Shull		
Room: Century B	Date: October 25, 2023	Time: 4:30 PM to 05:15 pm
Total Members: 71	Present at time of quorum check: 37	Attended per Record: 53
Guests present: 76	Membership requested: 5	Membership accepted: 3

L.1 Meeting Attendance

The Standards Subcommittee met on Wednesday; Oct 25th, 2023, at 4:30 PM (CST).

36 members were in attendance at the beginning of the meeting, which met the quorum requirement.

Based on attendance roster and after correction to membership, it was confirmed that **53 of 71** members were present. 76 guests were also present of which **5** guests requested membership of which **3** met attendance requirement and will be granted membership.

L.2 Chair's Remarks

The Chair welcomed members and guests to the F23 meeting. Chair briefly highlighted the requirement that while introducing one need to state their affiliation.

The Agenda was moved by Jerry Murphy and seconded by Bruce Forsyth. The motion was carried with unanimous consent. The Minutes for Spring 2023 was moved by Jerry Murphy and seconded by Forsyth. The motion was carried with unanimous consent.

Chair presented the IEEE requirement for patent and copyrights. The Chair reminded WGs that call of the patent is required a during every WG meetings including on-line/Teleconference meeting. If there are any patent claim, it shall be noted but not discussed at the working group meetings

The Chair reminded the WG and TF leaders to submit their minutes from the meetings within **15 days** to the SC secretary. The SC Secretary then must submit the SC minutes within 45 days of the SC meeting.

The chair reminded members of importance of responding to circulated surveys and email ballots. membership status can be changed based on participation or lack thereof for the electronic requests in addition to physical attendance.

WG on C57.12.00, C57.12.90, C57.12.80, C57.152 and C57.163 and TF on IEEE/IEC and Reverse Power flow provided an update on status of their standards/TF. Detailed WG/TF reports are included as part of this report.

- **WG C57.12.00:** Eric Davis reported PAR for next revision of C57.12.00 is valid till Dec 2026. Eric explained the operating mechanism of this WG (and C57.12.90) where work/technical discussions are done by respective task force and approved by respective subcommittee. WG per say doesn't review or approve the changes or additions recommended by TF and approved by SC. Sanjib Som stated WG not discussing and voting on the subject, is violation of P&P manual and requested chair to look into it.

- **WG C57.12.90 Test Code**: Steve Antosz had to leave early, so Ajith Varghese provided the WG status update . Like C57.12.00, Test code was released in 2021 and PAR for next revision is valid till 2026. 12 work items are fully approved to go into the next revision. There are about 14 other work items still being developed in the various task forces.

- **WG C57.12.70 Terminal Markings:** Currently not active and did not meet.

- **WG C57.12.80 Terminology Guide**: Sponsor ballot was completed and WG is working on comments resolution. Request for 3 new definitions were received but it was agreed to keep it pending for future work. WG plan to recirculate the ballot by the end of year.

- **WG C57.152 Field guide**: WG had quorum and approved a motion unanimously to move the guide to SC for approval to ballot. During SC, Marcos Ferreira made a motion which was seconded by Goran Milojevic to take the guide to sponsor ballot. The motion was approved unanimously.

- **WG C57.163 Guide for Establishing Power Transformer Capability while under Geomagnetic Disturbances:** Balloting process is complete and approved, pending editorial approval before releasing the guide.

- **TF IEEE/IEC Cross Reference**: TF met and discussed the framework of work to be carried out , use of collaborative tools for development, and high level expected output. Next step will create document index and identify the standards**.** SC Chair requested TF to review/include difference between air clearance chart, a concern reported by Peter Zhao

- **TF of Reverse Flow:** TF chair made a presentation during the TF meeting and completed the work assigned. TF voted on three possibilities – (1) update "service conditions" of the base standards (C57.12.00, C57.12.01, and etc.) (2) Individual standards/guide make necessary addition (3) Develop a new guide on reverse flow and identified the 1st and 3rd as items that need SC intervention. After some discussion in SC on this topic, a motion (moved by Eric Davis and seconded by Joshua Yun) was passed to setup a study group to (1) Provide recommendations to update "service conditions" of the base standards and (2) come up with scope and title for PAR to develop new guide. Ryan Hogg volunteered to lead this study group.

Subcommittee New business and SC attendees list are included at end of this minutes after WG/TF reports .

L.3 Working Group and Task Force Reports

L.3.1 Standards Working Group on the Continuous Revision of C57.12.00

Standards Working Group on the Continuous Revision of C57.12.00

Standards Subcommittee
IEEE/PES Transformers Committee
WG Chair: Eric Davis
Fall 2023 Milwaukee; October 25, 2023

INTRODUCTION

This is a working group by committee of task forces, for continuous revision of C57.12.00. The purpose of this WG is to compile all the work being done in various TF/WG/SC's for inclusion in the continuous revision of C57.12.00 in a consistent manner. The WG exists administratively in the Standards Subcommittee, and the technical work is done in other subcommittees, based on expertise and scope. This WG coordinates efforts with the companion standard C57.12.90 so that they publish together.

SUMMARY

C57.12.00-2021 was approved by IEEE SA Standards Board on November 9, 2021. and published January 2022. A Project Authorization Request (PAR) for Revision of PC57.12.00 was approved May 13, 2022. It expires December 31, 2026.

Several individuals expressed concern that WG membership was limited. This is not the case. Membership follows the requirement included in the appropriate P&Ps of the Transformers Committee.

The source of the altitude correction values was requested. This issue will be referred to the appropriate SC for investigation and response.

FUTURE REVISIONS AND PENDING WORK

Any new material provided by the various Task Forces to this WG for inclusion in the next revision, will first be approved by the responsible technical subcommittee (Dielectric Test, PCS, Distribution, IL, etc.) and then presented to the Standards Subcommittee for the "official" vote of approval to go to ballot.

The following groups are reviewing proposed changes that may impact this standard.

- TF Partial Discharge Tests for Class I Transformers (DiTest)
    - Several proposals were reviewed. The approved proposals will be included in the meeting minutes once received from the SC. Please refer to TF and SC meeting minutes for additional detail on the proposals.

        - Proposal 1: Change PD Class I criteria to 250 pC with a maximum 50 pC rise to match the Class II requirements. Approved.
        - Proposal 2: Keep the duration of the PD Test at 1 hour. Approved.
        - Proposal 3: Remove acceptance criteria for PD for units below 34.5-kV. Approved.
        - Proposal 4: All changes from the TF will be kept in Clause 10.7. Approved.
        - Proposal 5: Modify Table 3 so we have a section for Class I without PD and a section for Class I with PD. Approved.
        - Proposal 6: Modify Table 4. Not approved.
        - Proposal 7: Modify the Title of Table 3: Refer to Proposal 5
- TF PCS Continuous Revisions to C57.12.00 (PCS)
    - Item 112: Leave +/- 0.5% Tolerance on Ratio as is. Approved.
- TF Revision of Impulse Tests C57.12.00 & C57.12.90 (DiTest)

Changes ***already approved*** for the next revision:

1. Changes to Low Frequency Tests from Ajith Varghese's RLFT TF in the Dielectric Test SC. Final survey approved by TF and SC in the Spring 2023 meeting. Text in black is existing, red is revised, blue is added.

5.10.5.5 Induced-voltage test for Class II power transformers

With the transformer connected and excited as it will be in service, an induced-voltage test shall be performed as indicated in Figure 2, at voltage levels indicated in Columns 6 and 7 and 1.05 times the line to ground voltage per column 2 of Table 4. Minimum line-to-ground induced test levels for Class II power transformers shall be a multiple of corresponding line-to-ground nominal system voltage as follows: 1.58 times for one-hour tests and 1.8 times for 7200 cycles enhancement level tests.

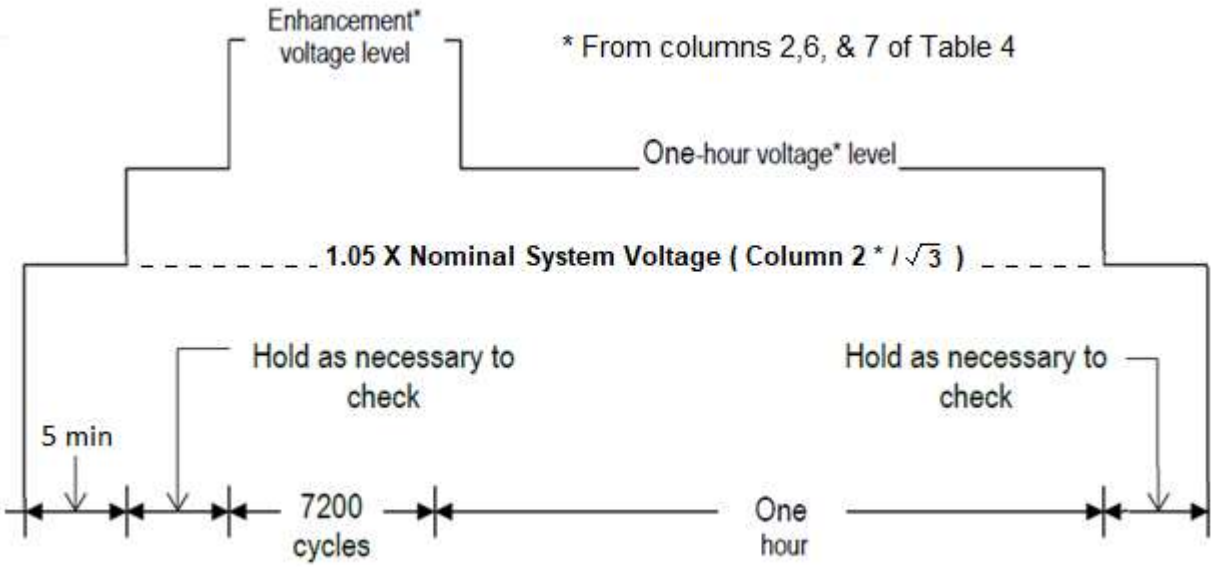

Figure 2 —Induced-voltage test for Class II power transformers

Respectfully submitted,
Eric Davis, WG Chair
November 19, 2023

L.3.4 WG Standards Transformer on Continuous Revision for C57.12.90

Standards Working Group on the Continuous Revision of C57.12.90
Standards Subcommittee
IEEE/PES Transformers Committee
WG Chair: Stephen Antosz
Vice-Chair/Secretary: Jason Varnell
Fall 2023 Kansas City; October 25, 2023 (changes in red text)

INTRODUCTION

This is a working group by committee of task forces, for continuous revision of C57.12.90. The purpose of the WG is to keep track of the work being done in various TF/WG/SC's for inclusion in the continuous revision of C57.12.90 in a consistent manner. The WG exists administratively in the Standards Subcommittee and has no live meetings. The technical work is done in other subcommittees based on expertise and scope. WG membership consists of the people actively working on revisions. These people are the TF Chairs, SC Chairs, and other significant contributors to the current version. WG Members are:

Hakan Sahin
Ramsis Girgis
Sylvain Plante
Ajith Varghese
Diego Robalino
Dinesh Sankarakurup
Daniel Sauer
Rogerio Verdolin
Poorvi Patel
Sam Sharpless
Bertrand Poulin guest
John Sen guest
Polo Rodriguez guest
Zan Kiparizoski guest

Currently there are six Task Forces in three different Subcommittees, as follows:

1. PCS – Cont Rev to Test Code C57.12.90 Clauses 5-9, & 12, TF Chair: Hakan Sahin
2. PCS – Audible Sound Revision Clause 13, TF Chair: Ramsis Girgis
3. Dielectric Test – Cont Rev to Impulse Tests in Clause 10, TF Chair: Sylvain Plante
4. Dielectric Test – Cont Rev to LowFrequency Tests Clause 10, TF Chair: Ajith Varghese
5. Dielectric Test –Insulation Power Factor and Resistance, 10.10 and 10.11, TF Chair: Diego Robalino (did not meet in Kansas City)
6. Insulation Life – Cont Rev to Temperature Test Clause 11 and Resistance Clause 5, TF Chair: Dinesh Sankarakurup

SUMMARY

C57.12.90-2021 was approved as a revised standard by the IEEE-SA Standards Board on Nov 9, 2021. It was published on Feb 4, 2022. The WG Chair took out a new PAR on Feb 28, 2022, which was approved by the IEEE-SA Standards Board on May 13, 2022. The PAR expires on December 31, 2026.

FUTURE REVISIONS AND PENDING WORK

Any new material provided by the various Task Forces to this WG for inclusion in the next revision, will first be approved by the responsible technical subcommittee (Diel Test, PCS, Dist, IL, etc.) and then presented to the Standards Subcommittee for the "official" vote of approval to go to ballot.

Changes *already approved* for the next revision:

1. Hakan Sahin's PCS TF for Revision of C57.12.90.

    a. Changes to subclause 7.3, Ratio test methods to "modernize" it. Final survey approved in the Spring 2021 virtual meeting.

    Insert a new subclause 7.3.1 as follows:
    7.3.1 Electronic ratio and phase measurement meters
    An electronic meter that determines the transformer turns ratio, polarity and phase angle may be used for the measurement of these parameters.

    The existing 7.3.1 Voltmeter method should be renumbered to be 7.3.2, are no changes to the text.
    The existing 7.3.2 Comparison method should be renumbered to be 7.3.3, no changes to the text or figures 10 & 11.
    The existing 7.3.3 Ratio meter clause and figure 12 is to be deleted.

    b. Ratio test voltage and frequency under subclause 7.1.2. Request to change frequency bandwith. TF and SC approved in Spring 2022.

    7.0 Ratio test
    Current Version:
    7.1.2 Voltage and frequency
    The ratio test shall be made at rated or lower voltage and rated or higher frequency.
    Revised Version
    7.1.2 Voltage and frequency
    The ratio test shall be made at rated or lower voltage and be such that the ratio of test voltage to test frequency is less than or equal to the ratio of rated voltage to rated frequency.

    c. Number of short-circuit tests under subclause 12.3.4. TF and SC approved in Spring 2022.

    Current Version:
    12.3.4 Number of tests
    Each phase of the transformer shall be subjected to a total of six tests satisfying the symmetrical current requirement specified in 12.3.1 or 12.3.2, as applicable. Two of these tests on each phase shall also satisfy the asymmetrical current requirements specified in 12.3.3.

    Revised Version
    12.3.4 Number of tests

- When a three-phase transformer is tested in a three-phase test circuit or in a single-phase test circuit as given in Annex C, each phase of the transformer shall be subjected to three tests satisfying the asymmetrical current requirements specified in 12.3.3. The tests shall be performed on one of the outer phases with the tap-changer in the maximum position, on the other outer phase with the tap-changer in the minimum position and on the middle phase with the tap-changer in the principal position
- When a single-phase transformer is tested in a single-phase test circuit the transformer shall be subjected to three tests satisfying the asymmetrical current requirements specified in 12.3.3. The three tests shall be performed one each, with the tap-changer in the maximum, minimum and principal position.

d. Load Tap Changer performance test with rated voltage. New subclause 8.7. TF and SC approved in Spring 2022. It was re-discussed in Fall 2022 but no changes were made so still considered to be approved.

8.7 Load Tap Changer Voltage Test

8.7.1 General

In order to verify the performance of a transformer that has a load tap changer (LTC), the LTC shall be operated through one end-to-end-to-end sequence (from one tap extreme to the other tap extreme and back again) with the transformer energized at rated voltage.

8.7.2 Control voltage

Control voltage for the LTC motor during the test shall be as near to rated voltage as possible, with a minimum of 85%.

8.7.3 Preparation for the test

The LTC shall be fitted with all included equipment. It shall be connected as it will be in service, including protective devices.

8.7.4 Procedure

Either the high or low voltage winding of the transformer under test shall be energized at rated voltage and frequency, unless otherwise specified. The LTC shall be operated using the motor drive but not manual rotation. The LTC shall be operated through all tap positions twice, starting at one tap extreme and progressing to the other tap extreme, and then return back again to the original tap position. The test may be performed at intervals, if necessary, such as to adjust the test circuit for the applied voltage to be adjusted to the rated voltage of the tap position, but it is a requirement that the transformer be energized at no less than rated voltage corresponding to each tap to be changed.

8.7.5 Observations and Analysis

8.7.5.1 Audible Sound

The transformer shall be observed during this test and the operator shall identify that the sound during the tap changing operations was either normal or abnormal. With some types of tap changers, there will be abnormally loud sounds if components are not assembled properly. Note that during operation of the change-over selector (reversing switch or coarse-tap selector) the sound can be slightly different.

8.7.5.2 Supply Test Circuit
The test control system shall be monitored for any trip of the test circuit that automatically stops the circuit from keeping the transformer energized.

8.7.5.3 Dissolved Gas-in-Oil Analysis
Oil samples shall be taken from the LTC compartment of vacuum type tap-changers before and after the test and analyzed for dissolved gasses. Results of the analysis may show some increase of dissolved gases due to current commutation, resistor heating and / or stray-gassing of the oil.

8.7.6 Failure Detection and Acceptance Criteria
The transformer will have passed this LTC Voltage test if:

- The tap changer operates normally with no abnormal sound
- The transformer stays energized without a trip in the supply test circuit
- For mineral oil filled vacuum LTCs, the increase of the sum of H2, CH4, C2H6, C2H4 and C2H2 should not exceed 12 ppm for in-tank type LTCs and 6 ppm for compartment type LTCs.
- For non-vacuum type LTCs, or LTCs filled with a liquid other than mineral oil, the determination of acceptance criteria is through sound only and there is not a limit for increase in gases.

e. Load Tap Changer performance test with rated current. New subclause 9.6. TF and SC approved in Spring 2022. It was re-discussed in Fall 2022 but no changes were made so still considered to be approved.

9.6 Load Tap Changer Current Test
9.6.1 General
In order to verify the performance of a transformer that has a load tap changer (LTC), the LTC shall be operated through one end-to-end-to-end sequence (from one tap extreme to the other tap extreme and back again) with the transformer current flowing through the windings, corresponding to the top nameplate MVA rating.

9.6.2 Control voltage
Control voltage for the LTC motor during the test shall be as near to rated voltage as possible, with a minimum of 85%.

9.6.3 Preparation for the test
The LTC shall be fitted with all included equipment. It shall be connected as it will be in service, including protective devices.

9.6.4 Procedure
The test shall be performed by applying a short circuit either the high-voltage winding or the low-voltage winding and applying sufficient voltage across the other winding to cause a specific current to flow in the windings. The LTC shall be operated using the motor drive but not manual rotation. The LTC shall be operated through all tap positions twice, starting at one tap extreme and progressing to the other tap extreme, and then return back again to the original tap position. The test may be performed at intervals, if necessary, such as to adjust the test circuit for the applied voltage to be adjusted to the required current of the tap position, but it is a requirement that the transformer be energized at no less than 80% of the top MVA nameplate current value for each tap change.

9.6.5 Observations and Analysis

9.6.5.1 Audible Sound

The transformer shall be observed during this test and the operator shall identify that the sound during the tap changing operations was either normal or abnormal. With some types of tap changers, there will be abnormally loud sounds if components are not assembled properly. Note that during operation of the change-over selector (reversing switch or coarse-tap selector) the sound can be slightly different.

9.6.5.2 Supply Test Circuit

The test control system shall be monitored for any trip of the test circuit that automatically stops the circuit from keeping the transformer energized.

9.6.5.3 Dissolved Gas-in-Oil Analysis

Oil samples shall be taken from the LTC compartment of vacuum type tap-changers before and after the test and analyzed for dissolved gasses. Results of the analysis may show some increase of dissolved gases due to current commutation, resistor heating and / or stray-gassing of the oil.

9.6.6 Failure Detection and Acceptance Criteria

The transformer will have passed this LTC Voltage test if:

- The tap changer operates normally with no abnormal sound
- The transformer stays energized without a trip in the supply test circuit
- For mineral oil filled vacuum LTCs, the increase of the sum of H2, CH4, C2H6, C2H4 and C2H2 should not exceed 12 ppm for in-tank type LTCs and 6 ppm for compartment type LTCs.
- For non-vacuum type LTCs, or LTCs filled with a liquid other than mineral oil, the determination of acceptance criteria is through sound only and there is not a limit for increase in gases.

2. Changes to Insulation Power Factor test, from Diego Robalino's Diel Test SC TF for Winding Insulation Power Factor. Final survey approved in the Fall 2021 virtual meeting and by DielTest SC Jan 2022. Specifically with regards to Subclause 10.10.2 revising the accuracy requirements of instrumentation.

The existing text is:

10.10.2 Instrumentation

The insulation power factor may be measured by special bridge circuits or by the voltampere-watt method. The accuracy of measurement should be within ± 0.25% insulation power factor, and the measurement should be made at or near a frequency of 60 Hz.

The revised text to replace it will be:

10.10.2 Instrumentation

The insulation line-frequency power factor or dissipation factor may be measured by special bridge circuits or by the voltampere-watt method. The accuracy of the measurement instrumentation at or near rated frequency should be:

- for Insulation Power Factor Below 1%: +/-2% of reading +/-0.05% absolute

- for Insulation Power Factor Above 1%: +/-5% of reading +/-0.05% absolute

3. Changes to Clause 11 Temperature Test, from Dinesh Sankarakurup's TF in the Insulation Life SC.

   a. Changes to subclause 11.3.2, Liquid Temp Rise Determination. Final survey approved by TF and SC in the Spring 2023 meeting. In the first paragraph change the word "ultimate" to "stabilized", and add a sentence that the top oil rise shall not be averaged over time. Text in black is existing, red is revised, blue is deleted.

   Liquid temperature rise is the difference between liquid temperature and ambient temperature. The ~~ultimate~~ stabilized temperature rise above ambient shall be considered to be reached when the top liquid temperature rise does not vary more than 2.5% or 1 °C, whichever is greater, during a consecutive 3 h period. The stabilized liquid temperature rise determined at the end of the total loss run shall not be averaged over time.

4. Changes to Audible Sound from Ramsis Girgis' TF in the Perf Char SC. These changes were approved by the TF at Spring 2023. The Perf Char SC approved in-person at the Kansas City meeting. Text in black is existing, red is revised, blue is deleted.

   a. Changes to 13.3.3.1 No-load audible sound level.

   When a transformer is equipped with a tap changer, the transformer may, on certain tap changer positions, produce sound levels that are higher than the audible sound level at the rated tap position. For these transformers, the measurements shall ~~may, upon purchaser request, and as agreed upon,~~ be made with the transformer on the highest sound producing tap position.

   Also, other excitation conditions may occur in service leading to lower, or higher, core noise. For example, transformers designed to operate with variable flux the core audible sound level is strongly impacted by the tapping position. The same is true for SVC transformers when connected to a capacitive load; Again, for these transformers, the measurements shall ~~may, upon purchaser request, and as agreed upon,~~ be made with the transformer operating at the highest sound producing condition.

   b. Changes to 13.5.5.1 Measuring ambient sound pressure level.

   ~~The ambient sound pressure level shall be established by averaging the ambient sound pressure levels measured immediately preceding and immediately following the sound measurements with the transformer energized. The ambient sound shall be measured at a minimum of four locations, and the instruments shall be in conformance with 13.2.~~ The ambient sound pressure level shall be measured at a minimum of four locations around the transformer immediately preceding and immediately following the sound measurements with the transformer energized. The ambient sound pressure level shall be established by calculating the logarithmic average of measured values of the ambient sound pressure levels. The measuring instruments shall be in conformance with 13.2. However, additional measurements may be made if agreed to by the manufacturer and purchaser or if the ambient measurements vary by more than 3 dB around the transformer. …

c. Changes to 13.3.3.2 Load audible sound level.

Since load audible sound becomes a contributor to the total audible sound of the transformer at higher loads, the load audible sound level shall be measured at the ONAF measuring contour. For transformers with only an ONAN rating, load noise is to be measured at the ONAN sound measuring contour.

5. Changes to Low Frequency Tests from Ajith Varghese's RLFT TF in the Diel Test SC. Final survey approved by TF and SC in the Spring 2023 meeting. Text in black is existing, red is revised, blue is deleted.

a. Changes to Induced Test for Class II, Clause 10.8.2 PD Test Procedure

10.8.2 Test procedure

The voltage shall first be raised from zero to the 1.05 X line to ground value of the nominal system voltage (column 2, C57.12.00 Table 4) and held long enough to attain a stable partial discharge level and then record the level of partial discharge. The voltage shall then be raised to the one-hour level and held for a minimum of 5 min or until a stable partial discharge level is obtained to verify that there are no partial discharge problems. The partial discharge level shall be measured at the end of the 5 min period. If the 5 min. period at the 1 h voltage level is extended to obtain a stable partial discharge level the partial discharge shall be measured at the end of this period so that the level of partial discharges are recorded just before raising the voltage to the enhancement level. The voltage shall then be raised to the enhancement level and held for 7200 cycles. The voltage shall then be reduced directly to the one-hour level and held for 1 h.

During this 1 h period, partial discharge measurements shall be made at 5 min intervals. Partial discharge acceptance criteria shall be based on each line terminal rated 69 kV and above. These measurements shall be made in accordance with 10.9.

Immediately following the 1 h period, the voltage shall then be reduced to 1.05 X line to ground value of the nominal system voltage (column 2, C57.12.00 Table 4) and held until a stable partial discharge level is obtained and the partial discharge level measured.

b. Changes to Induced Test for Class II, Clause 10.8.5 PD Failure Detection.

10.8.5 Failure detection

Failure may be indicated by the presence of smoke and bubbles rising in the insulating liquid, an audible sound such as a thump, or a sudden increase in the test current. Any such indication shall be carefully investigated by observation, by repeating the test, and by other diagnostic tests to determine whether a failure has occurred. In terms of interpretation of partial discharge measurements, the results shall be considered acceptable and no further partial discharge tests required under the following conditions:

a) The magnitude of the partial discharge level does not exceed 250 pC during the 1 h test period.
b) The increase in partial discharge levels during the 1 h period does not exceed 50 pC.
c) The partial discharge levels during the 1 h period do not exhibit any steadily rising trend, and no sudden sustained increase in the levels occurs during the last 20 min of the test.
d) The magnitude of partial discharge level at 1.05 X Nominal System Voltage following the 1 h test period does not exceed 100 pC.

PENDING WORK

Since this is a continuous revision document, there is ongoing work in Task Forces.

1. Possible revisions from Hakan Sahin's PCS TF for Revision of C57.12.90. As of October 24, 2023 there is only one item of business related to Clause 5 and determining the temperature used for measuring cold resistance. This item was

discussed; A small sub task force will be formed after Kansas City to develop wording to add to Clause 5.

2. Possible changes to Clause 13 sound test from Ramsis' TF. No open items, but new items of business that was discussed for future consideration is measuring sound level of Preventive Autotransformers (PA) in air as a Quality Control check.

3. Possible changes to Subclause 10.2 or 10.3 from Sylvain Plante's TF regarding switching and lightning impulse tests. The TF has the following items on its agenda and is working on possible revisions:
    - 10.3.2.2, 10.3.2.3, 10.4.4, 10.4.5 impulse tests on transformers with series-multiple and delta-wye connections. This was discussed again in Kansas City, survey done with high approval but some slight changes to be made. A final version is imminent.
    - Establishing guidelines about use of +/-3% tolerance on voltage peak. Draft wording was presented and discussed. Survey was done prior to Kansas City with high approval rate. A final version is imminent.
    - Proposal regarding tap for phase-to-phase switching impulse, 10.2.4. This work is more or less approved, TF Chair still going to do slight rewording based on feedback. A final version is imminent.

4. Other possible revisions to subclauses 10.5 to 10.10 from Ajith Varghese's TF for revision of low frequency tests.
    - Class I transformer PD test revision to the test procedure by Don Ayer's sub Task Force. A survey was done, results reviewed in Kansas City. In general, it was agreed to add test values in Table 3 of 12.00 and text in 10.7 of 12.90 to do a Class II 1-hr PD test on Class I transformers when requested by the customer. This work is nearing its end and seems like a final version is imminent.
    - Venting bushings during PD test, lots of discussion, this is a controversial topic, some proposed wording exists as a starting point but a small subgroup revised it again prior to Kansas City. Need collaboration with bushing manufacturers, transformer manufacturers, and users who all have different viewpoints. This work is nearing its end and seems like a final version is imminent. It was approved at the Dielectric Test Subcommittee meeting to go for survey of the DTSC.
    - A revision to add clarification to the overvoltage factor for Induced Test will be made in 12.00 and 12.90 as appropriate. Wording has been developed by Jason Varnell and seems like a final version is imminent.

5. Possible changes to subclause 10.11 from Diego Robalino's TF regarding insulation resistance. This work is ongoing, but the TF did not meet in Kansas City. Possible future changes to insulation resistance measurement procedures are being considered, as compared to conflicting procedures in other documents such as C57.152. Also, possible future addition of core megger and clamp megger procedures since none currently exist in 12.90.

6. Changes to Clause 11 Temperature Test from Dinesh Sankarakurup's TF

- 11.4.3 Add text that reverse correction for altitude is also allowed; i.e., when factory is located above 1000 m and transformer rating is based on <1000m. This work is ongoing in a small subgroup and is almost complete. A final version will be circulated for survey, after Kansas City.
- Request for clarification for temp test of 3-winding transformers, injecting maximum losses, and correcting for maximum common winding current in autos. Prior to Kansas City a small sub group developed some wording, it was briefly discussed in Kansas City. It will be circulated to the whole TF for comments.
- Proposal by Bertrand Poulin OFAF Cooling and Top Duct Oil temperature and diagram in C57.119. Prior to Kansas City a small sub group developed some wording, it was briefly discussed in Kansas City. It will be circulated to the whole Task Force for comments.
- Clarification to Hottest spot Rise calculation using Fiber Optics. Egon and Ewald Schweiger of Siemens advanced their proposal to add as an alternate method an option to measure hot spot temperature using direct measurement with fiber optic probes. A small sub task force will be formed to develop wording.
- Standardize Method for Hot resistance extrapolation not covered in Kansas City, but Bertrand Poulin submitted some info that should be circulated to the TF.

Respectfully submitted,
Stephen Antosz, WG Chair
Jason Varnell, WG Vice-Chair
October 25, 2023

L.3.5 WG Standards Transformer on Revision for C57.152, Guide of Field Tests

Standards Subcommittee,
WG – C57.152 Revision
IEEE / PES Transformers Committee

October 23, 2023, 11:00AM – 12:15PM
UNAPPROVED MINUTES

Welcome

The chair of the working group, Marcos Ferreira, and the secretary, Goran Milojevic, opened the meeting at 11:00AM.

1. Attendance and Attendance for Quorum

At the time of the meeting there were 38 Members, including Chair and Secretary. A total of 21 members were counted as present at the meeting. 76 members and guests signed into the circulating paper roster.

21 members present of 38 mean requirements for quorum were fulfilled. The list of attendees who signed into the paper roster is shown below:

Name	Affiliation	Status
Ferreira, Marcos	Quanta Technology	Chair
Milojevic, Goran	DV Power	Secretary
Colopy, Craig	Consultant	Member
Ermakov, Evgenii	Hitachi Energy	Member
Gustavsson, Niklas	Hitachi Energy	Member
Hayes, Roger	General Electric	Member
Herron, John	Raytech USA	Member
Locarno, Mario	Doble Engineering Company	Member
Mabrey, Stephanie	Weidmann	Member
Murray, David	TVA	Member
Poorvi, Patel	EPRI	Member
Robalino, Diego	Megger	Member
Saad, Mickel	Hitachi ABB Power Grids	Member
Sweetser, Charles	OMICRON Electronics Corp USA	Member
Tanaka, Troy	Burns & McDonnell	Member
teNyenhuis, Ed	IEEE	Member
Verdolin, Rogerio	Verdolin Solutions	Member
Welton, Drew	Intellirent	Member
Woods, Deanna	ATC LLC	Member
Abdalla, Isaac	HICO America	Guest
Alahmed, Alex	Evergy	Guest

Aldenlid, Jennie	Hitachi Energy	Guest
Avila, Hugo	Hitachi Energy	Guest
Balakrishnan, Mani	Instrument Transformer Equipment	Guest
Barker, Sean	Hitachi Energy	Guest
Betancourt, Edwin	Prolec GE	Guest
Brooks, Jeffrey	Power Engineers	Guest
Cross, James	Kinetrics	Guest
Cruz-Valdez, Juan Carlos	Prolec GE	Guest
Delgado, Gabriel	Invenergy	Guest
Digby, Scott	Duke Energy	Guest
Dolloff, Paul	EKPC	Guest
Espindola, Marco	Hitachi Energy	Guest
Eun Young Cho	HICO America	Guest
Faur, Florin	Prolec GE	Guest
Garcia, Eduardo	Siemens Energy	Guest
Gyore, Attila	M&I Materials	Guest
Hanson, Corey	Flex-Core	Guest
Hernandez, Ronald	Doble Engineering Company	Guest
Horn, Marcus	Pfisterer	Guest
Johnson, Jeremy	Burns & McDonnell	Guest
Knapp, Evan	Eaton	Guest
Kraetge, Alexander	Omicron	Guest
Linscheld, Kevin	Sherwin-Williams	Guest
Mai, Tim-Felix	Siemens Energy	Guest
Middleton, Robert	RHM International	Guest
Miller, Philip	Memphis Light	Guest
Mills, Francis	Power Engineers	Guest
Montanha, Juliano	Siemens Energy	Guest
Mushill, Paul	Ameren	Guest
Natale, Anthony	HICO	Guest
Neild, Kris	Megger	Guest
Patel, Rakesh	Hitachi Energy	Guest
Pidcock, Jay	Ameren	Guest
Radbrandt, Ulf	Hitachi Energy	Guest
Rathi, Rakesh	Virginia Transformers	Guest
Rehkopf, Sebastian	Maschinenfabrik Reinhausen	Guest
Rock, Patrick	American Transmission Company	Guest
Sahin, Hakan	Virginia Transformer Corporation	Guest
Simonov, Igor	Toronto Hydro	Guest
Snyder, Jason	First Energy	Guest
Speegle, Andy	Entergy	Guest
Swietkowski, Michael	Hitachi Energy	Guest
Thiede, Andreas	HIGHVOLT Prueftechnik Dresden	Guest
Tillery, Tim	Howard Industries	Guest
Tolcachir, Eduardo	TTE	Guest
Traber, Peter	Pfisterer	Guest

Uhlmann, Olivier	Reinhausen Canada	Guest
Vandervalt, Alwyn	ECI	Guest
Vary, Robert	Reinhausen	Guest
Vir, Dharam	Prolec-GE	Guest
Von Gemmingen, Richard	Dominion Energy	Guest
Werelius, Peter	Megger	Guest
Whitten, Christopher	Hitachi Energy	Guest
Ziger, Igor	Koncar	Guest
Ziomek, Waldemar	PTI Transformers	Guest

2. Approval of the Agenda

The motion to approve the agenda was made by Rogerio Verdolin, and seconded by Evgenii Ermakov. The motion was approved unanimously.

3. Approval of Minutes of Fall 2022 Meeting

The motion to approve the Minutes of Fall 2022 Meeting was made by Drew Welton, and seconded by David Murray. The motion was approved unanimously.

4. Call for Patents

The chair presented slide 1-4, dated January 2, 2018 informing of the IEEE patent policy and participants duty to inform. There were no issues related to patent assurance brought up by attendees in the meeting.

5. IEEE Copyright Policy

The chair presented IEEE-SA Copyright Policy slides 1-2 informing the audience of the policy.

6. Chair's Remarks

The chair, Marcos Ferreira, gave the following remarks.

"Between the Spring 2023 Meeting and the Fall Meeting, the full text of the draft of the proposed revision of the Guide was submitted to the members by email. Due to insufficient response, the required two-thirds majority for passing the ballot was not achieved. A PAR extension was requested and approved until 31 Dec 2025.

The draft of the document has been provided to all members and guests. During this meeting, the members of the Working Group will vote on officially accepting the proposed draft and submitting it to the Standards Subcommittee, with the goal of finalizing the work on the revision.

Thank you.

Marcos Ferreira, Chair of WG."

7. **Vote on accepting the proposed draft of the new revision of the Guide and submitting it to the Standards Subcommittee**

   The motion to vote was made by David Murray, and seconded by Rogerio Verdolin. The motion was approved unanimously by the present voting members.

8. **Comment Resolution Board**

   The officers informed the rest of the working group that, prior to the Spring Meeting, the following members of the group were invited to join the Comment Resolution Board: Marcos Ferreira, Marc Foata, Niklas Gustavsson, Mario Locarno, Goran Milojevic, and Charles Sweetser.

   Charles Sweetser commented that, due to the size of the standard, additional members of the Comment Resolution Board will be needed to properly address the expected comments. The officers invited additional volunteers to join the Board. Ronald Hernandez, Attila Gyore, Diego Robalino, Stephanie Mabrey, and Deanna Woods volunteered to assist with this effort. The final list of the comment resolution board members will be submitted by the officers to the working group members once the draft is ready for the balloting process.

9. **New Business**

   No new business this time.

10. **Meeting Adjournment**

    The motion to adjourn the meeting was made by Stephanie Mabrey, and seconded by Deanna Woods. The meeting was adjourned at 11:30AM.

Respectfully submitted,

Marcos Ferreira – Chair

Goran Milojevic – Secretary

L.3.6 TF - IEEE / IEC Continuous Cross Reference

Meeting Minutes

Standards Subcommittee Task Force
IEEE / IEC Cross Reference
Monday, October 23, 2023, 9:30am to 10:45am
Chair: Alan Washburn

1. Welcome
    a. Meeting came to order at 9:35am
2. Introduction of participants
    a. 17 attendees

Last Name	First Name	Email	Affiliation	Member	Guest	F23 Attendance	Request Membership
Bargone	Gilles	gilles.bargone@fiso.com	Fiso		X	x	
Bhardwaj	Rahul	rbhardwaj@burnsmcd.com	Burns & McDonnell		X	x	
Boettger	William	weboettger@aol.com	Consultant		X		
Castellanos	Juan	juangonzalo.castellanos@prolecge.com	Prolec GE		X	X	
Chao	Li	ChaoLi2@eaton.com	Eaton		X	x	X
Chorzepa	Jaroslaw	jaroslaw.chorzepa@us.abb.com	ABB		X	X	X
Czernorucki	Marcos	marcos.czernorucki@hitachienergy.com	Hitachi Energy		X	x	
Hernandez	Ronald	rhernandez@doble.com	Doble		X		
Hopkins	Traci	thopkins@h2scan.com	H2Scan		X	x	X
Koshel	Anton	akoshel@deltastar.com	Delta Star		X	x	
Kush	Arora	k.arora@us.reinhausen.com	Reinhausen		X	x	X
Lachance	Mathieu	mathieu.lachance@omicronenergy.com	Omicron		X		
Mellin	Toni	toni.mellin@vaisala.com	Vaisala	X			
Naja	Ismael	ismaelnaja@eaton.com	Eaton		X		
Prevost	Thomas	tom.prevost@weidmann-group.com	Weidmann	X		X	
Radbrandt	Ulf	ulf.radbrandt@hitachienergy.com	Hitachi Energy		X	X	
Robalino	Diego	diego.robalino@megger.com	Megger		X	x	
Sahin	Hakan	hakan.sahin@gatransformers.com	GA Transformers		X	X	
Stacy	Fabian	durand.stacy@hitachienergy.com	Hitachi Energy		X		
Steele	H. Allen	hasteele@tva.gov	TVA		X	X	
Sze	Matthew	matthew.sze@omicronenergy.com	Omicron		X	X	
Varghese	Ajith	ajith.varghese@prolec.energy	Prolec GE	X		X	
Washburn	Alan	awashburn@burnsmcd.com	Burns & McDonnell	X		X	
					Total	17	

3. IEEE SA patent policy and call for patents
4. IEEE SA copyright policy
5. Membership review
    a. 3 of 4 members present, quorum achieved
6. Review/approval of agenda
    a. Agenda was approved
7. Review/approval of S23 meeting minutes
    a. Minutes approved
8. Old business
    a. Scope of TF
        i. Continued discussion on index scope, format
        ii. Look for opportunities to make recommendations to IEEE or IEC organizations

9. New business
    a. Creation of index document
        i. Involvement of other stakeholders/subcommittees, may help to collect information more quickly
        ii. Start with TC-14 and TC-10
            1. List of documents
            2. Suggestion to use Collaboratec for a shared file area and working document tool
        iii. Outline or concept for index to be presented at S24 meeting
10. Adjourn

L.3.7 TF Reverse Power Flow

Minutes of Meeting
Task Force – Reverse Power Flow
Kansas City, MO – Oct 24, 2023

- The Working Group met at 15.15 in the Shawnee / Mission Room at the Kansas City Crown Center Hotel on Oct 24, 2023. This was the second meeting of the TF.

- The Chair, Dan Blaydon (Baltimore Gas & Electric), led the meeting; The Secretary, Ed teNyenhuis (Hitachi Energy), recorded the attendance and meeting minutes.

- There was 37 members present (out of 69 members). There were 69 guests and 26 requesting membership. There was a total of 106 attendees. Quorum was achieved.

First Name	Last Name	Affiliation	Mem-ber	Guest	F23
Elise	Arnold	SGB	X		X
Javier	Arteaga	Hitachi Energy	X		
Gilles	Bargone	FISO Technologies Inc.	X		X
Mats	Bernesjo	Hitachi Energy	X		X
Enrique	Betancourt	Prolec GE	X		X
Daniel	Blaydon	Baltimore Gas & Electric	X		X
William	Boettger	Boettger Transformer Consulting LLC	X		X
David	Calitz	Siemens Energy	X		X
Fidel	Castro	SDGE	X		
Thomas	Dauzat	AEP	X		
Nikolaus	Dillon	Dominion Energy	X		X
Jose	Gamboa	H-J Family of Companies	X		X
Eduardo	Garcia Wild	Siemens Energy	X		
James	Gardner	SPX Transformer Solutions, Inc.	X		
Carlos	Gaytan	Prolec GE	X		
Jeffrey	Gragert	Xcel Energy	X		X
Bill	Griesacker	W. Griesacker and Associates	X		
Kenneth	Hampton	Baltimore Gas & Electric	X		
Corey	Hanson	Advanced Power Technologies	X		X
Roger	Hayes	General Electric	X		
Carlos	Hernandez	Delta Star	X		
Jean	Hernandez	Neetrac - Georgia Tech	X		X
Ronald	Hernandez	Doble Engineering Co.	X		X
Saramma	Hoffman	PPL Electric Utilities	X		
Nicholas	Jensen	Delta Star Inc.	X		
John	John	Virginia Transformer Corp.	X		X
Christopher	Johnson	Oncor	X		X
Akash	Joshi	Black & Veatch	X		
Jerzy	Kazmierczak	Hitachi Energy	X		
Qasim	Khan	Neetrac - Georgia Tech	X		
Dmitriy	Klempner	Southern California Edison	X		
Mark	Lachman	Doble Engineering Co.	X		X
Junho	Lee	Hyundai Electric	X		X
Kumar	Mani	Duke Energy	X		
Daniel	Mulkey	Mulkey Engineering Inc.	X		X

Dwight	Parkinson	EATON Corporation	X		
Monil	Patel	Pacific Gas & Electric	X		
Sanjay	Patel	Smit Transformer	X		X
Vinay	Patel	Consolidated Edison Co. of NY	X		
Tim	Rocque	Prolec GE	X		X
Dinesh	Sankarakurup	Duke Energy	X		
Amitabh	Sarkar	Virginia Transformer Corp.	X		X
Anil	Sawant	Virginia Transformer Corp.	X		
Markus	Schiessl	SGB	X		X
Eric	Schleismann	Southern Company Services	X		X
Pugal	Selvaraj	Virginia Transformer Corp.	X		
Jaber	Shalabi	VanTran Industries, Inc.	X		
Hemchandra	Shertukde	University of Hartford	X		X
Avijit	Shingari	Pepco Holdings Inc.	X		
Christopher	Slattery	FirstEnergy Corp.	X		X
Sanjib	Som	Pennsylvania Transformer	X		
James	Spaulding	Fort Collins Utilities	X		
Arthur	Speegle	Entergy Services, Inc.	X		X
Markus	Stank	Maschinenfabrik Reinhausen	X		X
Ali	Syed	Comed	X		X
Ed	teNyenhuis	Hitachi Energy	X		X
Scott	Thomas	Hitachi Energy	X		
Eduardo	Tolcachir	Tubos Trans Electric S.A.	X		
Mark	Tostrud	Dynamic Ratings, Inc.	X		X
Cole	Van Dreel	American Transmission Co.	X		X
Jason	Varnell	Doble Engineering Co.	X		
Dharam	Vir	Prolec GE	X		X
Pragnesh	Vyas	Sunbelt-Solomon Solutions	X		X
Joe	Watson	JD Watson and Associates Inc.	X		X
Joe	White	Power Engineers	X		X
Fei	Yang	Hitachi Energy	X		
Guang	Yuan	Hitachi Energy	X		X
Michael	Zarnowski	Carte International	X		X
Peter	Zhao	Hydro One	X		
Tom	Aiken	Virginia Transformer Corp.			X
Stephen	Antosz	Stephen Antosz & Associates, Inc		X	
Kush	Arora	Maschinenfabrik Reinhausen		X	
Barry	Beaster	H-J Family of Companies		X	
Jason	Beaudoin	Weidmann Electrical Technology		X	
Duvier	Bedoya	Hitachi Energy		X	
Rahul	Bhardway	Burns & Mcdonnell			X
Kevin	Biggie	Weidmann Electrical Technology		X	
Jeremiah	Bradshaw	Bureau of Reclamation		X	
Chris	Brown	SDGE		X	
Juan Alfredo	Carrizales	Prolec GE		X	X
Vivian	Chan	Hitachi Energy		X	
Luiz	Cheim	Hitachi Energy			X
Rhett	Chrysler	ERMCO		X	X
Craig	Colopy				X
Craig	DeRouen	ERMCO		X	X
Scott	Digby	Duke Energy		X	X
Paul	Dolloff	EKPC			X
Fernando	Duarte	EPRI		X	
Roger	Dugan	EPRI		X	
Jonko	Dzodan	Koncar			X
Qusai	Elnimri	Vantran		X	
Marco	Espindola	Hitachi Energy			X
Hugo	Flores	Hitachi Energy			X
Sanford	Fong	Georgia Power Co.		X	
Raymond	Frazier	Ameren		X	X
Lorne	Gara	Shermco		X	
Miguel	Garcia	Hitachi Energy		X	
Dragana	Gasic	Koncar			X
Orlando	Giraldo	HJ			X
Ramsis	Girgis	Hitachi Energy			X
John	Herron	Raytech USA		X	

Ryan	Hogg	Bureau of Reclamation			X
Derek	Hollrah	Burns & Mcdonnell			X
Logan	Howell	Hitachi Energy			X
Nathan	Jacob	Camlin Energy		X	
Adams	Kayland	Prolec GE			X
Gary	King	Howard Industries		X	
Klaus	Koeck	Trench			X
Matija	Koprivnjak	Koncar			X
Anton	Koshel	Delta Star Inc.		X	X
Vijayan	Krishnamurthy	PTI			X
Krzysztof	Kulasek	Delta Star		X	X
Krystzof	Kulasek	Delta Star			X
Andrew	Larison	Hitachi Energy		X	
So-young	Lee	Hyundai Electric		X	
Aleksandr	Levin	Weidmann Electrical Technology		X	
Xose	Lopez-Fernanadez	University de Vigo			X
Mark	Lowther	Kruger			X
Joe	Machain	Prolec GE			X
Kushal	Mahajan	EATON Corporation			X
Tim-Felix	Mai	Siemens Energy			X
Daniel	Marlinez	JFE			X
Alberto	Marlinez	WEG Transformers USA Inc.			X
Lee	Matthews	Consultant		X	X
Omar	Mendez Zamora	Prolec GE		X	
Timothy	Menter	Lincoln Electric System		X	
Filip	Mikulecky	Siemens Energy			X
Emilio	Morales	Qualitrol			X
Michael	Morgan	Duke Energy		X	
Marta	Munoz	Hitachi Energy			X
Hugo	Murillo	H-J Family of Companies		X	X
Ali	Naderian	BBA			X
Volney	Naranjo	Megger			X
Aniruddha	Narawane	EATON Corporation			X
Anthony	Natale	HICO America		X	
Joe	Nims	Allen & Hoshall, Inc.		X	
Agustin	Ortega	Siemens Energy			X
Nitesh	Patel	Hyundai Electric			X
Jay	Pidcock	Ameren			X
Bertrand	Poulin	Hitachi Energy		X	
Thomas	Prevost	Weidmann Electrical Technology		X	
Jarrod	Prince	ERMCO		X	
Era	Rarevalo	BPA			X
Adnan	Rashid	Measurement Canada			X
Martin	Rave	ComEd		X	
Tim	Raymond	EPRI			X
Robert	Reepe	Georgia Power Co.		X	
Juan	Reyes	Hitachi Energy			X
Michael	Richardson	Ameren		X	
Yuri	Rossini	Siemens Energy			X
Albert	Sanchez	Knoxville Utilities Board		X	
Abdvlmajid	Shaikh	Delta Star		X	
Salahuddin	Shaikh	Hitachi Energy		X	
Masoud	Sharifi	SGRE			X
Steve	Shull	BBC			X
Andre	Simons	JFE			X
Kushal	Singh	Comed			X
Jason	Snyder	First Energy		X	
Yongtaz	Sohm	HICO America			X
Mavrico	Soto	Hitachi Energy			X
Brad	Staley	Leenward Renewable Energy		X	X
Andrew	Steineman	Delta Star			X
Chris	Steineman	Hubbell			X
Janusz	Szczechowski	Reinhausen			X
D	Tabakovic	Hubbell			X
Marc	Taylor	JFE			X
Mike	Thibault	Pacific Gas & Electric			X
Katapalli	Thrinadha	Virginia Transformer Corp.			X

Alan	Traut	Howard Industries		X	
Reinaldo	Valentin	Duke Energy		X	
Jos	Veens	SMIT Transformatoren B.V.		X	
Joshua	Verdell	ERMCO		X	
Rogerio	Verdolin	Verdolin Solutions			X
Karsten	Viereck	Reinhausen			X
David	Walker	MGM Transformers			X
Bruce	Webb	Knoxville Utilities Board		X	
Zachery	Weiss	WEG Transformers USA Inc.		X	
Drew	Welton	Intellirent			X
Devora	Wiesel	Con Edison			X
Jeff	Wright	Duquesne Light			X
Phil	Zinck	Emera		X	

- The agenda was presented and unanimously approved (Motion by Hem Shertukde and Seconded by Bill Boettger)

- The minutes from the Spring 2023 meeting were presented and unanimously approved (Motion by Hem Shertukde and Seconded by Bill Boettger)

- The Chair reviewed the TF objectives which are to evaluate the effect of reverse power flow and identify which standards or WG's are likely to be impacted. The Chair also briefly reviewed the first meeting presentations.

- A presentation was given by Chris Slattery of First Energy which showed:
    - Examples of reverse power flow up to 25% of rated load due to rooftop solar generation in the system
    - The transformers shown were Class I and were mostly older transformers (1960 – 1970 vintage)
    - These existing transformers were not rated for step up and step down like newer transformers

- It was asked if Battery Energy Storage would be part of the TF scope. It was decided this is outside the scope of this task force and it was mentioned that the topic would be brought up during the Performance Characteristics subcommittee meeting.

- It was commented by a utility that reverse power flow is seen on Class II transformers (i.e. 60 MVA)

- It was commented that the quality of the reverse power flow is also a problem (harmonics)

- A presentation was provided by the chair which showed the following:

    - Based on the discussions of the task force, the scope of the effects of reverse power flow is divided into the following categories: power and distribution transformers, new and existing transformers, service conditions (step-up, step-down operation), voltage/loading conditions, LTC controls/paralleling

- The various ways that the general requirements standards such as C57.12.00, C57.12.36, C57.12.01, incorporate the definitions of "step-down transformer and step-up transformer" (as defined in C57.12.80) into the service condition clauses of those standards. It was discussed that the service condition requirements as currently written do not account for transformers which could be operating as a "step-down transformer" or a "step-up transformer" (as the standards currently define it) based on the operating conditions.
- The guides where reverse power flow effects on voltage/loading conditions and LTC controls/paralleling could be addressed. There is ongoing work on some of these guides where reverse power flow considerations are already being addressed. One example is the C57.153 paralleling guide.

- The chair presented 3 possible pre-prepared recommendations to make to the Standards subcommittee to consider:
  - Option #1 – Recommend changes to service conditions in the general requirements standards
  - Option #2 – Identify which existing guides are affected and recommend those guides be revised to include reverse power considerations
  - Option #3 – Recommend development of "Guide for evaluating effects of reverse power flow on transformers"

- A motion was made by Sanjay Patel and seconded by Joe Watson that Options 1 and 3 be recommended to the Standards Subcommittee to be done. This motion passed (34 for, 2 against, 1 abstention). It should be noted that during the discussion portion of this motion, it was discussed that even though we are recommending the development of a new guide, that it should not preclude other guides currently being

- The meeting was adjourned at 4.29 PM. Motion by Joe Watson, seconded by David Walker. This was unanimously approved.

L.4 Old Business

There was no old business to discuss.

L.5 New Business

Sanjib Som brought up a concern that some of the Task forces are working outside of their defined scope and specifically noted C57.12.90 TF on sound test of transformer decided to move ahead with discussion to develop test protocol for Preventive auto and seeking data of test results from TF, even though it was pointed out during meeting that PA sound test is out scope of TF. Sanjib requested the chair to evaluate WG/TFs are operating per scope defined for WG/TF.

L.6 Attendance

Included as last two pages of this minutes.

L.7 Adjournment

The meeting was adjourned at 5:19 PM CST.

Respectfully submitted,
Ajith M. Varghese
Standards SC Secretary
11/15/2023

Standards SC F23 Attendance List

Role	First Name	Last Name	Company	10/25/2023
Guest	Abdul Majid	Shaikh	Delta Star Inc.	X
Secretary	Ajith	Varghese	Prolec GE Waukesha	X
Guest	Alan	Washburn	Burns & McDonnell	X
Guest	Alejandro	Macias	CenterPoint Energy	X
Guest	Alex	Ayala	Power Partners, Inc.	X
Guest	Alfons	Schrammel	Siemens Energy	X
Guest	Alireza	Gorzin	Black & Veatch	X
Guest	Allen	Steele	TVA	X
Guest	Anar	Tleoukoulov	Qualitrol Company LLC	X
Member	Andrew	Larison	Hitachi ABB Power Grids	X
Guest	Baptiste	Pousset	Transformer Protector Corp	X
Guest	Bertrand	Poulin	Hitachi ABB Power Grids	X
Member	Brad	Staley	Leeward Renewal	X
Member	Bruce	Forsyth	Bruce Forsyth and Associates PLLC	X
Member	Bruce	Webb	Knoxville Utilities Board	X
Guest	Carlos	Gaytan	Prolec GE	X
Guest	Charles	Sweetser	OMICRON electronics Corp USA	X
Guest	Christopher	Johnson	Oncor	X
Guest	Christopher	Slattery	FirstEnergy Corp.	X
Guest	Christopher	Whitten	Hitachi Energy	X
Guest	Cole	Van Dreel	American Transmission Co	X
Guest	Craig	Colopy	Retired	X
Member	Daniel	Blaydon	Baltimore Gas & Electric	X
Chair	Daniel	Sauer	EATON Corporation	X
Guest	Daniel	Posadas	Prolec SA	X
Guest	Daniel	Crockett	Ameren	X
Guest	Darrell	Mangubat	Siemens Power Operations Inc.	X
Guest	David	Calitz	Siemens Energy	X
Guest	David	Stankes	3M	X
Guest	Derek	Hollrah	Burns & McDonnell	X
Member	Dharam	Vir	ProlecGE Waukesha	X
Guest	Dinesh	Sankarakurup	Duke Energy	X
Member	Drew	Welton	Intellirent	X
Member	Dwight	Parkinson	EATON Corporation	X
Member	Ed	teNyenhuis	Hitachi ABB Power Grids	X
Guest	Edmundo	Asevid	BPA	X
Member	Eduardo	Garcia Wild	Siemens Energy	X
Guest	Edwin	Betancourt	Seimens Energy	X
Member	Egon	Kirchenmayer	Siemens Energy	X
Guest	Emilio	Morales-Cruz	Qualitrol Company LLC	X
Guest	Enrique	Betancourt	Prolec GE	X
Member	Eric	Davis	Burns & McDonnell	X
Guest	Erik	Tirado	OLSON	X
Guest	Evan	Knapp	Eaton	X
Member	Florin	Faur	Prolec GE Waukesha	X
Guest	Francis	Mills	Power Engineers	X
Guest	Gabriel	Delgado	Invergy	X
Member	Gary	Hoffman	Advanced Power Technologies	X
Member	Gilles	Bargone	FISO Technologies Inc.	X
Guest	Goran	Milojevic	DV Power	X
Guest	Grace	Guang Yuan	Hitachi	X
Member	Hemchandra	Shertukde	University of Hartford	X
Guest	Ismael	Naja	EATON Corporation	X
Guest	Janet	Crockett	FAYEYYEVILLE	X
Guest	Jason	Snyder	First Energy	X
Member	Javier	Arteaga	Hitachi ABB Power Grids	X
Guest	Jean Carlos	Hernandes Mejia	GT-NEETRAC	X
Member	Jeffrey	Wright	Duquesne Light Co.	X
Member	Jerry	Murphy	Reedy Creek Energy Services	X
Member	John	Herron	Raytech USA	X
Member	John	John	Virginia Transformer Corp.	X
Guest	Jonathan	Reimer	FortisBC	X
Member	Jonathan	Sinclair		X
Guest	Jose Luiz	Machain	Prolec GE	X

Role	First Name	Last Name	Company	10/25/2023
Member	Joshua	Yun	Virginia Transformer Corporation	X
Guest	Juan Alfredo	Carrizales	Prolec GE	X
Member	Juan Carlos	Cruz Valdes	Prolec GE	X
Guest	Junho	Lee	Hyundai Electric	X
Guest	Justin	Minikel	EATON Corporation	X
Member	kayland	Adams	ProlecGE Waukesha	X
Member	Kris	Zibert	Allgeier, Martin and Associates	X
Guest	Krishnamurthy	Vijayan	PTI Transformers	X
Guest	Kumar	Mani	Duke Energy	X
Member	Kurt	Kaineder	Siemens Energy	X
Guest	Lorne	Gara	Shermco	X
Guest	Luc	Loiselle	Tetratech	X
Guest	Malia	Zaman	IEEE	X
Vice-Chair	Marcos	Ferreira	Beale AFB	X
Guest	Mark	NewBill	Hitachi	X
Guest	Mark	Tostrud	Dynamic Ratings, Inc.	X
Guest	Matthew	Weisensee	PacifiCorp	X
Member	Michael	Botti	Hyosung HICO	X
Guest	Michael	Miller	Siemens Energy	X
Guest	Michael	Richardson	Ameren	X
Guest	Mickel	Saad	Hitachi Energy	X
Guest	Miguel	Plascencia	PGE	X
Guest	Nikolaus	Dillon	Dominion Energy	X
Member	Onome	Avanoma	MJ Consulting	X
Member	Peter	Zhao	Hydro One	X
Member	Philip	Hopkinson	HVOLT Inc.	X
Member	Poorvi	Patel	Electric Power Research Institute (EP	X
Member	Pragnesh	Vyas	Sunbelt-Solomon Solutions	X
Guest	Qasim	Khan	Neetrac	X
Member	Ramsis	Girgis	Hitachi ABB Power Grids	X
Guest	Raymond	Frazier	Ameren	X
Guest	Reto	Fausch	RF Solutions	X
Guest	Rhett	Chrysler	ERMCO	X
Guest	Richard	vonGemmingen	Dominion Energy	X
Member	Rob	Ghosh	General Electric	X
Member	Robert	Ballard	DuPont	X
Guest	Robert	Allison	Dominion Energy	X
Guest	Roberto Ignacio	Da Silva	Cargill	X
Guest	Ronald	Hernandez	Doble Engineering Co.	X
Guest	Ryan	Musgrove	Oklahoma Gas & Electric	X
Guest	Ryan	Hogg	Bureau of Reclamation	X
Member	Sanjib	Som	Pennsylvania Transformer	X
Member	Saramma	Hoffman	PPL Electric Utilities	X
Member	Scott	Digby	Duke Energy	X
Member	Scott	Reed	MVA	X
Guest	Sergio	Coreno Alonso	.	X
Member	Shankar	Nambi	Bechtel	X
Guest	Shawn	Gossett	Ameren	X
Guest	Stacey	Kessler	Ultieg Eng	X
Member	Stephen	Antosz	Stephen Antosz & Associates, Inc	X
Member	Stephen	Shull	BBC Electrical Services, Inc.	X
Member	Steven	Snyder	Hitachi ABB Power Grids	X
Guest	Sylvain	Plante	Hydroquebec	X
Member	Tauhid Haque	Ansari	Hitachi ABB Power Grids	X
Member	Thomas	Dauzat		X
Member	Thomas	Prevost	Weidmann Electrical Technology	X
Guest	Tiffany	Lucas, P.E.	ProlecGE Waukesha	X
Guest	Tim	Rocque	ProlecGE Waukesha	X
Member	Tim-Felix	Mai	Siemens Energy	X
Guest	Timothy	Raymond	Electric Power Research Institute (EP	X
Guest	Vivek	Bhatt	ProlecGE Waukesha	X
Member	Weijun	Li	Braintree Electric Light Dept.	X
Member	William	Whitehead	Siemens Energy	X
Guest	Zachery	Weiss	WEG	X
Guest	Zoltan	Roman	General Electric	X