IEEE SWITCHGEAR COMMITTEE

Minutes:	IEEE High-Voltage Fuses Subcommittee
Place:	Sheraton Sand Key, Clearwater Beach, FL
Date:	Wednesday April 19th, 2023
Presiding officer:	Sterlin Cochran – Chair
Recorder:	John Leach – Past Chair

MEMBERS PRESENT (10)

Chris Borck	Eaton
Sterlin Cochran	Eaton (SC Chair & Chair RFSWG)
Gary Haynes	ABB Inc.
Travis Johnson	Xcel Energy
John Leach	Consultant/self-affiliated
Caryn Riley	GT/NEETRAC
Jon Spencer	Utility Solutions
Randy Ward	Aluma-Form
Charles Worthington	Hubbell Power Systems
Danish Zia	UL LLC

MEMBERS ABSENT (6)

Glenn Borchardt	S&C Electric Co
Jeramie Cooper	Eaton
Jonathan Deverick^	Dominion Virginia Power
Chris Morton	PowerTech
Jim Wenzel	Eaton (Vice Chair & Sec)
Robert Wolf	Hubbell Power Systems

^ correspondence only

GUESTS (10)

Tim Anderson	Alumina-Form
Mohit Chhabra	S and C
Anand Chiravuri	Black and Veatch
Anil Dhawan	Alligia
Brennen Fleming	Hubbell Power Systems
Brendan Kirkpatrick	SCE
Eric Li	PowerTech
Pete Marzec	S&C Electric Co
Aaron Motes	ABB Inc.
Carlos Nieto	S&C Electric Co

HONORARY MEMBERS

John Angelis, L. Ron Beard, Glenn Borchardt, Ray Capra, Steve Hassler, Frank Ladonne, Chris Lettow, Jim Marek, Frank Muench, Don Parker, R. Neville Parry, Herb Pflanz, R (Kris) Ranjan, Tim Royster, John Schaffer, Mark Stavnes, Alan Yerges, Jan Zawadzki.

1. **Call meeting to order** - 12:39 pm (EDT)
2. **Approval of Agenda** – The agenda was approved by consensus after adding item 9a.
3. **Member/guest introduction –**. There were 10 members present, with 6 members not in attendance and 10 guests.

4. **Roster check –** Sign-in Sheet circulated.
5. **Approval of October 19th 2022 minutes –** The Fall 2022 minutes were approved by consensus.
6. **Report from the chair** – Sterlin reported that he is a representative to the T&I subcommittee but he would like to have someone else go from HVF. We have Caryn Rily and Charles Worthington attending also.
7. **Standards status report**
    a. C37.41: published April 2017, Corrigenda issued May 2017. Existing **PAR** for it to be combined with C37.42-2016, approved March 2020, expires Dec 2024. A PAR extension may be required if we cannot complete the document to be ready to ballot in less than one year.
    b. C37.42: published May 2017.
    c. C37.45: Published April 2017.
    d. C37.48: New revision published August 2020.
8. **Working Group Reports -**
    a. Revision of fuse standards – C37.41: Sterlin Cochran

    Sterlin reported that Task Force 3 (Test Series 4 for cutouts) met on Monday afternoon, April 17th and the WG met at 10:15 and 2:00 on Tuesday Oct. 18th and continued at 8:00 am on Wednesday Oct. 19th. There were 31 people present (15 voting members) at the meetings.

    Sterlin reported that TF3 has produces recommendations for the WG that were well received. It is anticipated that there will be a complete set of tables to include the TS4 testing and ancillary requirements in the standard before our fall meeting.

    The PAR for C37.41 expires December 2024 and the WG will continue to work to that date, but it is likely that a PAR extension will be required.

    At the Tuesday meetings, work continued reviewing the draft PC37.41 document. Work is presently concentrating on Clause 18, testing for polymeric insulators as this was new in the last revision and after experience using it minor improvements are needed.
9. **Report of liaison to other committees -**
    a. ER&P Committee – S. Cochran: ER&P continues to look for ways to improve engagement and for ways to communicate the value of attendance at Standards meetings. One proposal is to use one morning (Wednesday for example) for a series of educational presentations, not opposite WG meetings. This could encourage utilities to send young engineers to gain even more education and training as a result of our meetings. This would likely require the extension of meetings to Thursday afternoon, requiring returning home on Friday rather than the Thursday currently done by the majority of attendees.
    b. T&I committee – S. Cochran. Sterlin and Caryn reported that the two current projects hope to have papers published before the end of 2023 on the issue of 200% overvoltage, and before the end of 2024 on the ageing of switchgear. A new possible project involves publishing common “tags” for utility equipment enabling utilities to trade assets, something not possible at the moment. Initially this would concentrate on circuit breakers and reclosers, but fuses are a future possibility, although differences in fuse curves makes this harder.
10. **IEC Report – J. Leach – (full report Annex A)**

a. The IEC General meeting was held in San Francisco October 29-November 2, 2022. John had attended approximately 10 IEC meetings, both live and on-line, since October 2022.

b. John reported that Sterlin Cochran had been appointed convenor of SC32A/MT3, expulsion fuses. This team will also maintain IEC 60282-4, the polymer cutout standard. John is stepping back from MT3, and MT7 but retaining convenorship of MT6 (tutorial and application guide).

c. Changes in the scope of SC32B (LV fuses) will allow them to cover all AC semiconductor fuses (of any voltage) and AC fuses designed and used as LV fuses but with voltages up to 1 500 V. HV DC fuses (suitable only for a time constant less than 3 ms) are proposed to be covered by a new HV DC fuse standard (under TC32). An NP should be issued for this project shortly.

d. JMT 441: all definitions of common interest in IEC are combined in one document. Meetings continue to be held to update the switchgear, controlgear and fuses section (441).

11. Unfinished business – nothing to report.

12. New business – none.

13. Future meetings -

Fall 2023 (October 08 – 13), Catamaran Resort, San Diego, CA

Spring 2024, (March 32st – April 4th) Westin Beach, Fort Lauderdale, FL

Fall 2024, (October 13th – 17th) OMNI Hotel, Oklahoma City, OK

Spring 2025, (October 13th – 17th) Wyndham Grand Orlando Resort Bonnet Creek, Orlando, FL

Fall 2025 (October 5th – 9th) Peppermill Resort, Reno NV

14. Adjournment - 2:30 pm

Submitted by John Leach, 4/23/2022

Annex A

TC32/SC32A - U.S.A. T echnical A dvisory G roup

Dr. John G. Leach, Technical Advisor ◆ j.g.leach@ieee.org ◆ 828-256-3744

IEC Report 2022-1 October 2022 to April 2023

From: Dr. John G. Leach, Technical Advisor TC32 and SC32A, April 14th 2023

Summary

Since the October 2022 report there have been TC32 and SC32A US TAG meetings and the 2022 IEC General meeting in San Francisco, with its associated plenary meetings and TC/SC maintenance Team/Working Group meetings, followed by several on-line TC meetings. SC32C did not meet at the General Meeting. As a result of the plenary meetings, the Strategic Business Plan of TC 32 and its subcommittees SC 32A, SC 32B and SC 32C was finalized at the meetings and has been approved by the SMB. This impacts some of the “cross-over” scope issues between SC32A and SC32B.

SC32A MT3

MT3 met on Saturday 29th October 2022, in San Francisco, USA, under Convenor John Leach. Other US representation was Sterlin Cochran and Jim Wenzel. There were two other members present, representing France and Slovenia, and a guest, SC Secretary Raphaël Buisson. There were 13 members absent. John reported on MT activities since the last meeting (Lyon, 2019-06-06) that included publication of IEC 60644/AMD1 ED2 (2019-09-23) and IEC 60282-1 Ed 8 (2020-04-16). He also reported that that WG8 successfully completed the development of IEC 60282-4, expulsion fuses using polymeric insulators, under Convenor Sterlin Cochran. The particular significance of this is that this represents the subcommittee's sixth standard. With this we meet one of the Standards Management Board's criteria for an active subcommittee, that formerly we did not. John reported on the TC activities relating to TC32/WG1 and WG2 involving issues of common interest to SC32A and SC32B. John also pointed out that there are presently no active projects in MT3 and stated that it was his intention to give up the Convenorship of MT3 as soon as a suitable volunteer can be found. He feels it would be appropriate for someone younger, and who is now more actively involved in the industry than he is, to take over for the future. The meeting lasted 90 minutes.

SC32A MT6

MT6 met on Saturday October 29th, 2022 in San Francisco, CA, USA under Convenor John Leach. Other US representation was Sterlin Cochran and Jim Wenzel. There were three other members present, representing France, Spain, and Slovenia, and a guest, SC Secretary Raphaël Buisson. There were 8 members absent. The meeting started at 11:00, after the brief MT3 meeting and continued until 5:15pm. John reminded everyone that changes were needed to the Tutorial and Applications Guide, IEC 62655 based on changes to IEC 60282-1 in the 8th edition. Also, because minor changes had been necessary in order to produce the IEEE equivalent document (IEEE C37.48 – 2020, published since the previous meeting), such changes, other than differences in terms, would be reviewed for inclusion in our revision. The document was examined from clause 5 until the end of the report. Most of the proposed changes were just statements of fact (e.g., differences in the revision of IEC 60282-1) so generated little comment. It was agreed to recommend to the subcommittee that IEC 62655 be revised, as Edition 2, with the first CD to be circulated mid-2023. Date and place of next meeting: It was decided to wait until the CD had been circulated before deciding on future meetings. The changes being proposed, while sufficient to warrant a new edition (an amendment not being "user friendly" enough for a tutorial and application guide) do not represent a lot of "new" material, and so comments to the CD may not be extensive.

TC32/WG1 meetings

TC32/WG1 met on Monday October 31st, 2022 in San Francisco, CA, USA under Convenor Jean-François (although Secretary Michael Altenhuber runs the meetings). Work on the document continued. It is anticipated that a NP will be issued mid-2023. This will require National Committees to vote on whether HV DC fuses becomes a project and will have to recommend experts to the WG. The document we have been working on will be issued as part of the NP, and countries will be requested to send in comments. An additional on-line meeting was held on April 14th 2023 in place of a meeting in Slovenia in February that had to be cancelled due to the postponement of SC32B MT meetings to have taken place at the same time. Additional meetings are planned for June and September.

SC32A and TC 32 TAG meetings, October 19th, and October 24th 2022, respectively

The TAGS took the unusual step of having meetings (this was the first SC32A TAG meeting in over 30 years). The meetings were scheduled in order to discuss the TC32 Strategic Business Plan, primarily related to the scope of the HV and LV subcommittees related to HV DC and HV AC. In both meetings there was significant discussion on the issues associated with WG2 of TC32 regarding changing the scope of SC32B in relation to existing "High-Voltage" fuses that are designed and tested as LV fuses. The final conclusions were to recommend that semiconductor fuses of any AC voltage be covered by the SC32B standards, and that, providing there was clear indication why such fuses are a special case, AC fuses up to 1 500 V could be included in the scope of SC32B. Proposed wording was "In special cases, where fuses having dimensions and construction typical for LV fuses are necessary for the application, rated voltages can be increased up to and including 1 500 V AC and 2 000 V DC". This was submitted as comments to the SBP by the USNC. Regarding SC32A, the US also supported the appointment of Sterlin Cochran as Convenor of MT4 (and MT8) and John Leach for MT6 (he expressed a desire to step down from MT3 and MT7).

SC32A Plenary meeting

SC32A met on the morning of Tuesday November 1st, 2022 in San Francisco, CA, USA under Chair John Leach, and secretary Raphaël Buisson. There were 17 members and guests in attendance. Other US representation was Sterlin Cochran and Jim Wenzel. Decisions included: approval for the revision of IEC62655 (Tutorial and application guide); that the proposal to revise the IEC 60282-2 will be decided at the next plenary meeting (the stability period of IEC 60282-2 will be extended to 2025); John Leach was re-appointed as convenor of MT3 as no other candidates were present (Dirk Wilhelm, Germany, was to be contacted to see if he would take this on); MT4 will take over the responsibility of maintaining 60282-4 and Sterlin Cochran was appointed convenor of MT4; John Leach was reappointed convenor of MT6, Viktor Martincic was appointed convenor of MT7 (capacitor fuses); WG8 was disbanded.

There was considerable discussion concerning the TC Strategic Business Plan and the proposed wording to allow SC32B to cover "HV" fuses that were designed and used as LV fuses. Most of the SC32B members who would be present at the TC meeting were present for this discussion. It may be noted that the Chinese positions to SC32A, and comments to the SPB, took opposite views, as did the German comments to SC32A and their suggestions for the SPB. Michael Altenhuber (secretary 32B) bemoaned the fact that countries did not seem to be able to come up with a unified position (as the US had done!) The US position (from the TAG meetings) was generally supported – the final decision was supposed to be discussed by the CAG and confirmed at the TC plenary meeting.

Future meetings: The SC will request the UK NC to issue an invitation to hold our next plenary meeting at the IEC general meeting in Edinburgh, UK, in 2024 (October 21st to 26th).

SC32B Plenary meeting

SC32B met on the afternoon of Tuesday November 1st, 2022 in San Francisco, CA, USA under Chair Jean-François De Palma and Secretary Michael Altenhuber. At the WG1 meeting on Monday, John Leach had been requested to attend the SC32B meeting representing the USA (no one else from the US was staying the extra day). He was able to secure an official HoD position for the SC32B plenary meeting (held in the afternoon after the SC32A meeting). In this meeting, there was agreement to adopt the suggestions of the US to the SBP circulation. John worked with Michael in the break to include all of our proposed

wording (some from the original AHG INF). This was adopted by SC32B, and since most of the CAG members were present (except for Raphaël) the Wednesday morning CAG meeting was cancelled. This was because the work to be done at the CAG was to discuss the results of the SBP circulation, produce the compilation of comments, and come up with the draft SBP to present to the TC. All this work was done within the two SC meetings (perhaps somewhat unorthodox, but it saved us a meeting and allowed everyone present to participate).

TC32 Plenary meeting

TC32 met on the afternoon of Wednesday November 2st, 2022 in San Francisco, CA, USA under Chair Viktor Martincic and Secretary Dr. Jean-Francois DePalma. Twelve members were present, including 3 from the US. Reports from the subcommittees were received. The proposed SBP with associated scopes for TC32, SC32A, SC32B and SC32C, were accepted. The scope for SC32B states: "To prepare standards for the following types of fuses intended to be used at nominal voltages not exceeding 1 000 V AC or 1 500 V DC and, for semiconductor fuse-links, for circuits of higher nominal AC voltages. In special cases, where fuses having dimensions and construction typical for LV fuses are necessary for the application, rated voltages can be increased up to and including 1 500 V AC." This leaves us with the following positions, both for the immediate future, and for possible long-term projects.

LV AC fuses (regular) ≤ 1 000 V – responsibility SC32B (no change)
LV DC fuses ≤ 1 500 V – responsibility SC32B (no change)
"LV" AC fuses (special) ≤ 1 500 V – responsibility SC32B (*changes to LV standards required*)
HV DC fuses (low TC) > 1 500V – responsibility TC32 (*new standard, WG1*)
AC semiconductor fuses, all voltages – responsibility SC32B (no standard change required)
HV AC fuses (distribution) >1 000 V – responsibility SC32A (no change)
"LV" AC fuses (special) > 1 500 V – responsibility SC32A (new LV fuse-like standards would be required)
HV DC fuses (high TC) > 1 500 V – responsibility SC32A (possible future DC distribution requirements).
Blue = no present plans for implementation. Note that the final item is based on research in Europe involving medium voltage DC distribution, so would be 10-15 years in the future.

JMT 441

John Leach is a member of this joint maintenance team for the Electropedia section 441 (IEC 60050-441 Switchgear, controlgear and fuses). The aim is to bring up-to-date the definitions in this section. Since October 2022 there has been November 15th 2022 and January 26th 2032 meetings and the next meeting will be April 21st. On March 30th there was a meeting of IEC TC32/MT3 (maintenance team for 441) called by acting convenor John Leach in order to obtain input from SC32B and SC32C.

Date and place of next IEC TC and SC32A meetings: It is hoped that there will be meetings at the 2024 General meeting in Scotland, UK. Other on-line and in-person meetings have yet to be scheduled.

John Leach, 4/15/23