

IEEE SWITCHGEAR COMMITTEE CORRESPONDENCE

Minutes: IEEE High-Voltage Fuses Subcommittee
Place: St. Pete Beach, Florida
Date: Wednesday, April 29th, 2015
Presiding officer: John Leach - Chair
Recorder: Alan Yerges

MEMBERS PRESENT

Glenn Borchardt	S & C Electric Company
Gary Haynes	ABB Inc.
John Leach	Consultant - Hi-Tech Fuses/T&B/ABB
Chris Lettow	S&C Electric Company
Sean Moody	Mersen
T. E. Royster	Dominion Virginia Power
Alan Yerges	Eaton's Cooper Power Systems
Jon Spencer	Hi-Tech Fuses/T&B/ABB
Jonathan Deverick	Dominion Virginia Power
Sterlin Cochran	Hubbell Power
Charles Worthington	Hubbell Power

MEMBERS ABSENT

Mark Stavnes	S & C Electric
Dan Gardner^	Thomas & Betts/ABB
J. R. Marek^	Consultant
R. Neville Parry	Eaton

GUESTS

Jeff Kester	Hubbell Power
R. Elizondo	ABB
Sam Chang	PG&E
Frank Lambert	NEETRAC
Douglas Fitchett	Self-Employed
Brad Lewis	AEP
Travis Johnson	Xcel Energy
Jim Wenzel	Eaton's Cooper Power Systems

HONORARY MEMBERS

J. G. Angelis, L. R. Beard, R. L. Capra, S. P. Hassler, F. Ladonne, H. Pflanz, R. Ranjan, J. S. Schaffer, Frank Muench, (New) Don Parker: proposed and moved to honorary status, (new) Jan Zawadzki: proposed and moved to honorary status.

1. **Call meeting to order** - at 1:35 PM
2. **Approval of Agenda** – No changes requested, agenda accepted.

3. **Member/guest introduction** – 11 members 8 guests
4. **Roster check**– roster circulated for correction.
 - a. Jonathan Deverick: Requested and was approved for membership in the subcommittee.
 - b. Don Parker: Proposed and approved for honorary member status.
 - c. Jan Zawadzki: Proposed and approved for honorary member status.
5. **Approval of September 24th, 2014 minutes** – Approved as circulated.
6. **Report from the Chair:** Nothing new to report, outside of later agenda items.
7. **Standards Document Status Report:**
 - a. PAR for C37.41 and C37.42 - are due for revision by 2016 (first ballot in 2015).
 - b. PAR for C37.45 has been requested (ballot in 2015).
 - c. Intending to have PAR next year for C37.48 revision
 - d. New regulations require a revision every 10 years, or standard will expire.
 - e. Standards Status report attached as Annex B
8. **Working Group Reports**
 - a) **Revision of Fuse Specification Standards – J. Leach** John reported that:
 - The Revision of Fuse Standards Working Group met on Tuesday, 4/28/15 with 14 Members and 6 Guests, and on Wednesday with 17 members and 5 guests (a total of 29 persons).
 - Approved multiple additions to the draft of PC37.41 (of greater significance, beyond administrative), including altitude correction factors that maintain traditional values (as in IEC Fuse documents) but with reference to IEEE C37.100.1 common clauses numbers.
 - Dielectric testing, allowing reference to Standard 4.
 - Significant discussion on new topics:
 - Test Series 4 expansion for cutouts. Action item was to give the current draft back to the task force for completion of revisions by the Fall meeting. It was agreed upon to develop a homogeneous series proposal that will require testing within a tolerance above and below the auxiliary tube burst point. The Task Force will put primary focus on updating the drafted table of test conditions.
 - Polymer Cutout task force report out was provided. This provided an update on the test proposal and NEETRAC testing completed to date. Further testing continues, and continued review of the proposal will be conducted by the task force.
 - b) **Revision of Fuse Specification Standards – M. Stavnes.** John reported that:
 - This group did not meet this session as activities are on hold until C37.41 progresses further.
 - Mark has applied for a PAR for C37.45 revision.
9. **Report of liaison to other committees**
 - a. ER&P Committee met 4/29/2015 (J. G. Leach)
 1. General discussion on recognition awards / proposals.

2. Subcommittee chairs are encouraged to promote members to become senior members of IEEE, and to become fellows in the future.
3. Continuing push in the Switchgear committee to write technical papers.

10. IEC Report – J.G. Leach: A summary of the Report to the TAG (attached as Annex A) is:

- a. Maintenance Team 3 met in Geneva March 18-19, 2015.
- b. Maintenance teams include coverage of current limiting fuses (MT3), expulsion fuses (MT4), Application Guise (MT6) and capacitor fuses (MT7).
- c. 80th General Meeting to be scheduled in Frankfurt October 10-15th, 2016. This will require John Leach to miss the Fall, 2016 IEEE Switchgear meeting due to this conflict. The General Meeting (at which the Subcommittee meets) is required to authorize a revision of IEC 60282-1, much of the work of which has been done ahead of time due to the tight time frame permitted for such a revision.
- d. MT were notified that an amendment to IEC 60282-1 has been published. It includes liquid tightness testing similar to that in IEEE C37.41. We have since included the improved wording in C37.41.
- e. Discussion included
 1. Limits of Temperature and Temperature Rise; Should this be included in the type test or Ratings and Characteristics clause.
 2. Terminology for different levels of earthing and grounding
 3. It was decided to permit dc for the use of temperature rise and power dissipation tests (not TCC tests). Impact is negligible. We should consider for the fall meeting as to whether to include dc, and if power dissipation should be required. (watts-loss measurements are regularly advertised in Europe).
- f. Next meeting in Dresden Germany on 9/13/2015. John Leach is championing others to attend ICEFA (fuse conference).
- g. TAG (Technical Advisory Group):
 1. Frank Muench retired from MT3 support – so no one from Eaton is currently supporting.
 2. ABB, Eaton, Hubbell, Siemens, Schneider, UL, NEMA are all open to be part of the TAG without cost. Benefits include early access to standards.
 3. Express interest in your membership to the TAG group to John Leach

11. Unfinished business – None

12. New business –

- a. Latest proposal for the IEEE Switchgear Procedures Manual was released.
 1. HV Fuses Subcommittee Scope
 1. Concerns raised with drafted scope to include up to 3000V dc.
 2. Moved by John Leach to remove this section from the scope.
 3. Tim Royster seconded
 4. All voted in favor, no abstains.

13. Next meetings:

Fall 2015, (September 20 – 24), Catamaran Resort Hotel, San Diego

Spring 2016 (April 25th-29th) Sonesta Resort, Hilton Head, SC, USA

Fall 2016 (Oct 9th-14th) Sheraton Station, Pittsburgh, PA

14. Adjournment – 2:23PM

Annex A

SC32A - U.S.A. Technical Advisory Group

Dr. John G. Leach, Technical Advisor ♦ j.g.leach@ieee.org ♦ 828-256-3744 ♦ Fax 828-322-2376

IEC Report 2015-1 September 2014 to April 2015



From: Dr. John G. Leach, Technical Advisor SC32A, April 26th 2015

Summary

Since the September 2014 report there has been a meeting of MT3 in Geneva, Switzerland, Wednesday-Thursday March 18-19 2015. The amendment and consolidated version of IEC 60282-1 Ed.7.1 has been published.

The next meeting of MT3 is to be held in Dresden Germany on Sunday September 13th 2015, the day before the 10th ICEFA (fuse conference). The 80th General meeting of the IEC will be in Frankfurt, October 10 to 15, 2016. It is anticipated that TC32 and all three subcommittees will meet.

Reports of activities

MT3

The current-limiting fuse maintenance Team met in Geneva, Switzerland, Wednesday-Thursday March 18-19 2015. Participants were:

Harold Handcock

Ulrich Haas

John Leach (Convenor IEC 32A MT7)

Stephane Melquiond

Juan-Carlos Perez-Quesada (Convenor IEC 32A MT4)

Jože Pihler

Norbert Stein (Convenor IEC 32A MT3 and MT6)

Didier Fulchiron (Secretary SC32A)

Members were reminded that the 80th General meeting of the IEC will be in Frankfurt, October 10 to 15, 2016. It is anticipated that all three subcommittees will meet as well as TC32. MT3 has to present a report on the exploratory work we have been doing on a revision of 60282-1, including commercial justification for changes. It is anticipated that this will be prepared by John Leach in time for a review at our September meeting. An official invitation to the Frankfurt meeting has to be sought.

The MT noted the publishing of the amendment and consolidated version of IEC 60282-1 Ed.7.1. It contains minor errors, introduced during the editing, but it was felt that they were not serious enough to warrant a corrigendum. They can be corrected in the next revision that the team is working on.

Most of the time at the meeting was spent reviewing changes to IEC 60282-1 for the next edition, implemented as a result of decisions made in London in March 2014. They are summarized below:

- a) Restructuring of Ratings and characteristics (into “all fuses”, and “particular fuse-link types and applications”). The structure proposed at the 2014 meeting and implemented in the draft was accepted. It was decided that subclauses that perform the function of definitions (e.g. rated current of a fuse base) will be structured as definitions i.e. it should be possible to substitute the wording of the subclause for the defined term so the description should not start with “The”. It was also decided that we would use “a fuse base”, “a fuse-link”, etc. rather than “the fuse base”, “the fuse-link” (we are not consistent in the current document). There was some discussion as to whether Table 6 “Limits of temperature and temperature rise for components and materials” should be in the “Ratings and characteristics...” clause, where it is at the moment, or in the type tests clause. While temperature is not a rating, it does provide information useful to the user, and is not just used by fuse manufacturers in testing. It could be considered a characteristic (different temperature rises are permitted depending on the contact materials [characteristics] of the fuse-link/fuse-base). It was decided to leave the Table and the “temperature rise limits” that makes reference to it in their traditional location, the “ratings and characteristics” clause. We will compare our table to the latest used by switchgear documents. Similarly switching voltages provides useful information for users and so should remain in ratings and characteristics.
- b) Restructuring of type tests (into all fuses, and particular fuse-link types and applications). The structure proposed at the 2014 meeting and implemented in the draft was accepted.
- c) Other topics:
 - The MT had decided to review the terminology for different levels of earthing as applied to three-phase systems. While the term “effectively earthed neutral system” is used in IEC 62271-100 and -103, the definition is complex (relating to the ratio of the zero-sequence reactance to the positive-sequence reactance, etc.) and may not be applicable to all distribution systems. In addition, since the definitions say “Normally such systems are solidly earthed (neutral) systems or low impedance earthed (neutral) systems” it was decided to retain the use of solidly and low impedance earthed systems.
 - It was decided to permit d.c. to be used for temperature rise tests and power dissipation (but not time-current tests). The rationale is that the difference in fuse heating between a.c. and d.c. is effectively negligible, and the normally used approximation to watts loss (fuse current multiplied by voltage drop) is slightly more accurate with d.c.

- Simplification of the temperature measurement subclause was made (mostly removal of references to thermometers, which were not felt to be appropriate for measuring fuse component temperatures).
- The proposal to modify the use of random timing for test Duty 3 when fuse-links have very short pre-arcing times was agreed to (at times less than about 0.1 s, any significant asymmetry in the waveform leads to a shorter – and so less severe – test condition).
- In the subclause “Acceptance of a homogeneous series of fuse-links by interpolation”, (interpolating fuses having different lengths/voltage ratings) “Back-Up” was added as these rules were meant only for Back-Up fuses (there is a reference to minimum breaking current in the rules).
- Possible changes for fuses that use thermally activated strikers were discussed and some references to them were added. More work on this is necessary.
- There was a discussion on the restrictions on single element fuses in regard to homogeneous series requirements. The present standard introduced a requirement (inadvertently) that precludes the use of a homogeneous series in regard to Test Series 3, requiring every rating to be tested. This error does not occur in IEEE standards since they have maintained the same wording that appears in older IEC standards. It was agreed that this situation should be re-assessed during the revision process.

Date and place of next meeting: The next meeting of MT3 is to be held in Dresden Germany on Sunday September 13th 2015, the day before the 10th ICEFA (fuse conference). Whether another meeting will be necessary before the 80th General meeting of the IEC in Frankfurt, October 10 to 15, 2016, will be decided in Dresden. If found necessary, the meeting will be in Grenoble, France. The 80th General meeting of the IEC will be in Frankfurt, October 10 to 15, 2016. It is anticipated that TC32 and all three subcommittees will meet (note that this will clash with the IEEE fuse meetings!).

John Leach, 4/26/15

Annex "B" Project status

Document	Title	Sub-Committee	WG Chair	PAR	IEEE Status	Activity/Plans
C37.40	Standard Service Conditions and Definitions for High-Voltage Fuses, Distribution Enclosed Single-Pole Air Switches, Fuse Disconnecting Switches, and Accessories.	HVF	John Leach 828 256 3744 j.g.leach@ieee.org		Approved 2003 R2009	To be combined with C37.41
C37.41	Standard Design Tests for High-Voltage Fuses, Distribution Enclosed Single-Pole Air Switches, Fuse Disconnecting Switches, and Accessories	HVF	John Leach 828 256 3744 j.g.leach@ieee.org	Approved 2012-16 Revision	Approved 2008	Revision to incorporate C37.40
C37.42	Standard Specification for High-Voltage (>1000 V) Expulsion Type Distribution Class Fuses, Fuse and Disconnecting Cutouts, Fuse Disconnecting Switches, and Fuse Links, and Accessories Used with These Devices.	HVF	Mark Stavnes 773-338-1000, Ext. 2071 MStavnes@sandc.com	Approved 2012-16 Revision	Approved 2009	Revision to incorporate C37.43, C37.46 and C37.47
C37.43	Standard Specifications for High-Voltage Expulsion, Current-Limiting and Combination Type Distribution and Power Class External Fuses, with Rated Voltages from 1kV through 38kV, Used for the Protection of Shunt Capacitors	HVF	John Leach 828 256 3744 j.g.leach@ieee.org		Approved 2008	None – to be combined with C37.42
C37.45	Standard Specifications for High-Voltage Distribution Class Enclosed Single-Pole Air Switches with Rated Voltages from 1kV through 8.3kV	HVF	Mark Stavnes 773-338-1000, Ext. 2071 MStavnes@sandc.com		Approved 2007	Revision to incorporate material from C37.41 and C37.40 – PAR has been requested for ballot in 2015 and completion by 2016
C37.46	Standard for High-Voltage (>1000 V) Expulsion and Current-Limiting Type Power Class Fuses and Fuse Disconnecting Switches.	HVF	Mark Stavnes 773-338-1000, Ext. 2071 MStavnes@sandc.com		Approved 2010	To be combined with C37.42
C37.47	Standard Specifications for High-Voltage (>1000 V) Current-Limiting Type Power Class Fuses and Fuse Disconnecting Switches	HVF	Mark Stavnes 773-338-1000, Ext. 2071 MStavnes@sandc.com		Approved 2011	To be combined with C37.42
C37.48	Guide for Application, operation, and Maintenance of High-Voltage Fuses, Distribution Enclosed Single-Pole Air Switches, Fuse Disconnecting Switches, and Accessories	HVF	John Leach 828 256 3744 j.g.leach@ieee.org		Approved 2005 R2010	None - Good to 2020 PAR to combine C37.48 and C37.48.1 with IEC/TR 62655 to be sought in 2015
C37.48.1	Guide for the Application, Operation, and Coordination of High Voltage (>1000 V) Current-Limiting Fuses.	HVF	John Leach 828 256 3744 j.g.leach@ieee.org		Approved 2011	None – Good to 2021 See C37.48