

IEEE SWITCHGEAR COMMITTEE CORRESPONDENCE

Minutes: IEEE High-Voltage Fuse Subcommittee
 Place: Myrtle Beach, South Carolina
 Date: April 28th 2010
 Presiding officer: John Leach - Chair
 Recorder: Frank Muench - Secretary

MEMBERS PRESENT

G. Borchardt S & C Electric Company
 G. Haynes ABB Inc.
 J. G. Leach Consultant - T&B/Hi-Tech Fuses
 F. J. Muench Cooper Power Systems
 T. E. Royster Dominion Virginia Power

MEMBERS ABSENT

J. G. Angelis* Consultant
 F. Calderon AC Electric Systems
 R. L. Capra Consultant
 D. Gardner^ T&B – Hi-Tech
 S. P. Hassler* Cooper Power Systems
 F. Ladonne* Underwriters Laboratories
 J. R. Marek^ Consultant
 D. Parker Alabama Power
 R. N. Parry^ Cutler Hammer
 R. Ranjan* Consultant
 J. S. Schaffer* G & W Electric Co.
 M. Stavnes^ S & C Electric
 J. Zawadzki^ Powertech Labs Inc.

* Correspondence Only ^ Excused

GUESTS

Sachim Puramik Hubble Power Systems
 Jon Spencer T&B/Hi-Tech
 Frank Lambert NEETRAC
 Chris Lettow S&C
 Sean Moody Ferraz Shawmut
 Alan Yerges Cooper Power Systems

1. **Call meeting to order - at 1:35**
2. **Member /guest introduction** – 5 members 6 guests
3. **Roster check:** no changes – question as to whether Fernando Calderon has withdrawn – chair will try to find out (his IEEE e-mail no longer works).
4. **The IEEE Patent policy:** Presented and explained
5. **Approval of September 30th 2009 minutes:** Minutes reviewed and approved as circulated

6. Report from the Chair: Nothing to report beyond that which will be discussed later.

7. Standards status report: Attached as appendix B. Summary:

- a. C37.40 – 2003 reaffirmed 2009
- b. C37.41 – 2008
- c. C37.42 – 2009
- d. C37. 43- 2008
- e. C37.45 – 2007
- f. C37.46 – Par approved 2009 – recirculation ballot this year
- g. C37.47 Revised Par released 2009 – expect to ballot this year
- h. C37.48 – **Will submit a reaffirmation ballot this year**
- i. C37.48.1 PAR approved 2009 for revision .

8. Working Group Reports

a. Revision of Fuse Specification Standards – M. Stavnes - 9 member 5 guests were present. For Mark, John/Frank reported:

1. C37.42 was approved in 2009 and published on January 29th 2010.
2. Completed review of ballot for C37.46; 6 or 7 changes and new data were incorporated. A final review draft will be sent out and a new circulation ballot will take place this year. A significant addition is a sentence explaining that “essentially symmetrical current” is used to create TCC curves – this is normal practice but not presently documented. It is recommended that more comprehensive wording be included in the next revision of C37.41.
3. Incorporated information from C37.46 into C37.47. These documents cover power and distribution fuses, and are very similar. The revised document will be sent for final review and hopefully for ballot this year.

b. Revision of Fuse Standards - J. G. Leach - 13 members (2 new) and 2 guests. John reported:

1. We are nearing a document that can be balloted for C37.48.1. The group completed a review of the entire document.
2. An updated document will be circulated so we can determine if we should ballot this document in 2010, before the Las Vegas meeting.

9. Report of liaison to other committees

ER&P Committee – J. G. Leach:

1. At the PES level, one submitted paper won an award.
2. At The Technical Council level, a fuse paper has won an award and the Revision of Fuse Standards WG has won the WG award for C37.41. These awards are to be presented at the Switchgear Meeting this week.
3. Two Honorary Memberships have been granted – Tom Tobin and Bob Puckett

4. Discussion on changing the number of editors for papers. Suggestion was to reduce the number of editors to 4. 1. RODE, 2. HVF, 3. HVS-HVCB, 4. LVSD-SA.
5. Alberto Pigni will present a discussion of CIGRE CA3.21 on Solid Dielectrics – composites (all except ceramics) tomorrow as the technical presentation.
6. Will consider having Las Vegas meeting social at Hoover Dam
7. We will continue to publish the WG minutes with the subcommittee minutes rather than as separate entries

10. Report of IEC activities - J. G. Leach: See Annex A.

11. Unfinished business - none

12. New business - none

13. Next meeting: September 29th in Las Vegas

14. Adjournment - 2;15PM

Annex A – IEC report

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 2010-1 April 2010



From: Dr. John G. Leach, Technical Advisor SC32A, April 23rd 2010

IEC actions since September 2009:

There have been two groups of IEC meetings involving HV fuses since September 2010. The first was the Plenary meeting Tel Aviv on October 18th/19th. At this meeting The subcommittee met (SC32A) and Maintenance Team 3. The second group of meetings took place in Frankfurt on the 23rd, 24th and 25th of March, and consisted of MT3, WG6 and MT7 meetings. John Leach attended both groups of meetings while Frank Muench attended the Frankfurt meetings.

Tel Aviv

SC32 A met October 18th with seven countries represented, under the chairmanship of our new chair Mariusz WILNIEWCZYC (Poland). Also present were:

SC32A Secretary: Mr. Didier FULCHIRON (France)

IEC Central Office: Peter J. LANCTOT

Germany: STEIN, Norbert - Head of delegation

Mexico: HERRERA MOJICA Irving Alexis - Delegate

Slovenia: MARTINCIC Viktor - Head of delegation

U. K. HANDCOCK Harold - Delegate

U. K. : ROSEN Philip - Delegate

U. S.A.: LEACH John - Head of delegation

The most important point discussed was the finding of AHG1 – a recommendation to form a working group to develop a fuse user's guide. This was accepted by the SC and this Working Group (WG6) was set up under the convenorship of Norbert Stein and with John Leach the secretary.

Another issue discussed was that of the IEC capacitor fuse standard 60549 "High-voltage fuses for the external protection of shunt power capacitors". This has not been revised since the first edition of 1976. In North America (where more capacitor fuses are used) this document was used as the basis for a much expanded capacitor testing document, now incorporated into IEEE C37.41. It was therefore decided to set up a new Maintenance Team (since both expulsion and current-limiting fuses are used for this application) to attempt a revision of 60549 based on the existing IEEE standard and subsequent experience with using it. John Leach was asked, and agreed, to take the convenorship of this MT7.

Germany had raised the concern that the present IEC 60292-1 had oil-tightness tests for fuses used in switchgear but they were not rigorous for fuses used in transformers. SC 32A agreed that MT3 should address this area of concern, noting that the IEEE (ANSI) fuse standards have included testing for fuses for this application for approximately 30 years. The good experience gained from using such testing should be valuable in determining appropriate testing for inclusion in 60282-1. A derogation was subsequently requested from the SMB about the MRD (maintenance result date) of the IEC 60282-1. It was changed from 2016 to 2013.

Under "any other business" Germany requested a discussion on the topic of the selection of the rated voltage of current-limiting fuses used on isolated or resonant earthed system networks, where double earth fault has to be considered. It was noted that while this issue is covered in the application section of IEC 60282-1, the wording was confusing and did not state clearly that a fuse rating of 115% of the line-to-line voltage should be used (referring rather to tests at a higher voltage being necessary). Since this is an area to be covered by the new Fuse User's Guide, it was agreed that steps would be taken to clarify this subject in the Guide. Whether changes to wording needed to be made in IEC 60282-1 depends on the timing of a revision to this standard and the publishing of the User's Guide, and whether application information is to be removed from all other fuse standards when the Guide is published.

MT3 met in the afternoon of October 18th, with the same members present as SC 32A (except for Peter Lancet). In addition to discussing the issues covered above, it was noted that the FDIS "IEC 32A/274/FDIS" of 17 July 2009 had no negative votes and minor editorial comment and had been published as Edition 7. After the close of business, and on the morning of October 19th, members met to discuss Draft 6 of the Fuse User's guide, produced by AHG1 and circulated before the meeting for comments. Most comments received before and during the meeting were then discussed, and additional changes were made. These changes were circulated to MT3 and former AHG1 members as Draft 7a (note that the AHG1 was automatically disbanded during the SC 32A meeting after their recommendations were accepted). It was reported that after these changes had been seen by everyone, any changes that were not disputed would be adopted, and this document would form WG6-Userguide-D1, the first working document of the new WG. This was done.

After the plenary meeting, a schedule for WG6 was developed by the secretary of SC32A. This was quite aggressive, despite concerns by WG6 members, and called for a committee draft by September 2010 (recommendations by members had been not before mid 2011). As a result, John Leach made extensive revisions to the draft document, with significant input from Phil Rosen, to enable an extensively revised document to be discussed at the first WG meeting in April.

Frankfurt Meetings

MT3 met in Frankfurt on March 23rd 2010. Members present were:
Heinz-Ulrich Haas

Harold Handcock	
John Leach	(Convenor IEC 32A MT7)
Viktor Martincic	
Stéphane Melquiond	
Frank Muench	
Joze Pihler	
Wilhelm Rondeel	
Phil Rosen	
Norbert Stein	(Convenor IEC 32A MT3 and WG6)
Marc Arens	Guest from WG6 (from mid day)
Thierry Rambaud	Guest from WG6

Oil-Tightness tests: Proposals from John Leach and Ulrich Haas had been received. A draft document was developed based on compromises between the two proposals. It was decided to propose that the new tests be described as being for fuses to be used in transformers, and include a choice of maximum test temperature of 120 °C or 140 °C to cover present European and North American practice. It was also decided to make some changes to the present oil-tightness testing. The title changes to “Insulating liquid-tightness testing” and a paragraph added to discuss alternative liquids, suggesting that testing in oil covers them providing they are inert relative to the sealing system (i.e. the liquid does not degrade the seals).

The proposed IEC transformer fuse testing is similar to the present testing except that a low temperature part of the cycle is included (to –30°C the same as IEEE standard fuse testing). Also an increased number of samples tested and number of cycles is included, also taken from IEEE standards. The argument for the numbers is that if we are to justify to customers why we think the new temperature cycling test is adequate for transformer applications, we can point to over thirty years of successful experience using the IEEE testing method.

Selection of rated voltage for fuses used on isolated or resonant earthed systems: Norbert Stein had made a proposal to address this situation, which is already described in the application clause of IEC 60282-1 (9.3.4). However the application information is not normative, and if fuses having a rated voltage rating at least 15% higher than the maximum system voltage are not used, then a single fuse attempting to clear a line-to-line fault may fail. Additional clarification was added to the wording in the application guide section of the standard, but since “shall” cannot be used in an advisory clause, it was also decided to add information to the section on “Standard conditions of use”, and by including the word “shall” address the issue correctly.

WG 6 met following the MT3 meeting and all day of the 24th (with the addition of Mariusz Wilniewczyc). The target date for the first CD is September 30th 2010. When this date was set, at the end of 2009, it was felt by many to be unrealistic. However the view was expressed that sufficient work had been done in creating draft 2 that it may be possible to meet this deadline, without another meeting, providing that a) the whole of draft 2 could be examined by the group in this meeting, b) no very contentious issues appeared, and c) those issues that were raised could be worked on via e-mail before September.

Only one member of MT3/WG6 (Frank Muench) had supplied any significant comments before the meeting, although others had brought comments with them. Therefore the version of draft 2 marked up by Frank was used to examine all proposed changes to draft 1. The whole document was examined before the end of the meeting and most of the proposals in D2 were accepted, although many minor changes to the proposed text were agreed. It was also agreed that several issues and sections needed more work than could be done in the meeting. Members therefore

agreed to make proposals to be circulated to the group over the next few weeks. Since the meeting, many relatively minor changes have been made and Draft 3 has been circulated.

MT7 met on the morning of March 25th 2010. Five of the seven members were present:

Harold Handcock

John Leach (Convenor IEC 32A MT7)

Viktor Martincic

Stéphane Melquiond

Frank Muench

Norbert Stein (guest, Convenor IEC 32A MT3 and WG6)

The maintenance Cycle Report, with target, dates was not published before the meeting and it was proposed to do this after a better idea existed of the scope and magnitude of the revision. A comparison (produced by John) of IEC 60549 1976 and capacitor fuse testing in IEEE C37.41 2008 had been produced. This was discussed. It was noted that the capacitor fuse testing in IEEE standards was based in IEC 60549 with some "improvements". However IEC 60549 has not been changed in 32 years and the IEEE testing was developed about 20 years ago. Only John Leach, of the members present, had actually conducted any significant capacitor fuse testing (to the IEEE standard). While differences between the IEC and IEEE documents were not very large, it is known that testing to either standard has presented significant difficulties for test stations, and some requirements are felt to be unrealistic. John gave the opinion that there was as much "wrong" with the newer IEEE standard as with the IEC document, so the IEEE document, while providing input into the revision, cannot be used as the basis of the revision. The present standards were written before Full-Range fuses became common, and contain no reference to testing in the "cross-over" region required by some Full-Range fuses. It is therefore likely that specification of capacitive cross-over tests will be required in the same manner as inductive cross-over tests (now covered in IEC 60282-1 and C37.41). Heinz-Ulrich, who had not been able to stay for the MT7 meeting, had reported that he had performed capacitor fuse tests and had experienced problems testing to IEC 60549. He agreed to supply a list of comments based on this experience. Viktor knows a capacitor engineer, who he will contact with a view to inviting him to participate in our MT. All members agreed to contact test station personnel who may have had experience testing capacitor fuses. John agreed to raise the issue with the IEEE HV Fuses Subcommittee at their meeting in April to see if any members have recent capacitor fuse testing experience.

It was proposed therefore to gather information over the next few months to enable a better understanding of the task ahead of the Maintenance Team. A fall meeting on September 7th/8th (in London) was arranged to determine in more detail what needed to be done and make firm plans for a CD and MCR. However we are being pressured by the chair of the sub-committee to come up with a firm schedule in the next few weeks.

John Leach, 4-23-10

Annex B

Document	Title	SubCommittee	WG Chair	PAR	IEEE Status	Activity
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	None
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 2008	None
C37.42	Standard Specification for High-Voltage Expulsion Type Distribution Class Fuses, Cutouts, Fuse Disconnecting Switches and Fuse Links	HVF	Mark Stavnes 773-338-1000, Ext. 2071 MStavnes@sandc.com		Approved 2009	Published January 2010.
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
C37.45	Standard Specifications for High-Voltage Distribution Class Enclosed Single-Pole Air Switches with Rated Voltages from 1kV through 38kV	HVF	Mark Stavnes 773-338-1000, Ext. 2071 MStavnes@sandc.com		Approved 2007	None
C37.46	Standard for High-Voltage Expulsion and Current-Limiting Type Power Class Fuses and Fuse Disconnecting Switches	HVF	Mark Stavnes 773-338-1000, Ext. 2071 MStavnes@sandc.com	Approved 2009	Approved 2000	In ballot
C37.47	Standard Specifications for High-Voltage Current-Limiting Type Power Class Fuses and Fuse Disconnecting Switches	HVF	Mark Stavnes 773-338-1000, Ext. 2071 MStavnes@sandc.com	Approved 2009 Rev	Approved 2000	In revision
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	Re-affirmation this year
C37.48.1	Guide for the Operation, Classification, Application, and Coordination of Current-Limiting Fuses with Rated Voltages 1-38kV	HVF	John Leach 828 256 3744 j.g.leach@ieee.org	Approved 2009-13	Approved 2002 R2008	In revision.