IEEE SWITCHGEAR COMMITTEE CORRESPONDENCE

Minutes:	IEEE High-Voltage Fuses Subcommittee
Place:	San Antonio, TX
Date:	Wednesday, September 18th 2013
Presiding officer:	John Leach - Chair
Recorder:	John Leach

MEMBERS PRESENT

Glenn Borchardt	S & C Electric Company
Garry Haynes	ABB Inc.
John Leach	Consultant - T&B/Hi-Tech Fuses/ABB
Chris Lettow	S&C Electric Company
Sean Moody	Mersen
R. Neville Parry	Eaton
T. E. Royster	Dominion Virginia Power
M. Stavnes	S & C Electric
Charles Worthington	Hubble Power Systems
Alan Yerges	Eaton's Cooper Power Systems

MEMBERS ABSENT

D. Gardner^	Thomas & Betts – Hi-Tech
J. R. Marek^	Consultant
Frank Muench	(Eaton's Cooper Power Systems)
D. Parker^	Alabama Power
J. Zawadzki^	

^ Excused

GUESTS

Bob Barrio	Parsons
Jonathan Deverick	Dominion VA Power
Bryant Hains	Hubble Power Systems
Edward Jankowich	Thomas and Betts
Scott Lanning	Eaton
Jon Spencer	T&B
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

1. **Call meeting to order -** at 1:30 PM
2. **Approval of Agenda** – No changes requested, agenda accepted.
3. **Member/guest introduction** – 10 members 7 guests
4. **Roster check–** roster circulated for correction.

5. **Approval of May 1st 2013 minutes –** Meeting date corrected and approved with this correction.

6. **Report from the Chair:** – Frank Muench has now retired. Since it is not clear whether he will be sponsored to return to our group, the position of Secretary will be kept open until the Spring meeting. If Frank cannot return, another Secretary will be needed and members were asked to consider volunteering for this position (the proposed IEEE WG Policies and Procedures advise that we have a secretary).

7. **Standards status report:** Attached as Annex "B", with plans for "The end of the world", i.e. 2018 when most standards expire.

8. **Working Group Reports**

   a) **Revision of Fuse Specification Standards – M. Stavnes.** Mark reported that:

   - The Revision of Fuse Specification Standards Working Group met on Tuesday, 9/17/13 with 16 Members (five of them new) in attendance, and 1 Guest.
   - They reviewed D7 of PC37.42 and agreed to focus this document as exclusively as possible on Preferred Ratings, Design Test Requirements, Construction, and Marking Requirements – removing anything that is a better fit in C37.41. This removed almost four complete clauses from the document. It was agreed to incorporate into a D8 the changes discussed at the meeting, and then this document will largely watch the C37.41 revision activity and follow until such time as both documents are balloted. A request to revise the PAR (due to the removal of C37.45 from its scope) is expected after the May meeting.
   - The second draft of C37.45 was reviewed. The group confirmed basic approach to head in a direction of this being as stand-alone as possible (with limited reference to C37.41). If it becomes necessary to reference C37.41, we will need to either reference the new version (and ballot simultaneously) or reference an essentially obsolete version.
   - Therefore, the decision was to delay C37.45 PAR application until closer to the C37.41/C37.42 ballot.
   - D3 will be created and moved forward in the meantime.

   b) **Revision of Fuse Standards - J. G. Leach**. John reported that:

   - The revision of fuse standards Working Group met on Wednesday September 18th with 17 members and two guests.
   - John reported that since the IEC/Technical Report 62655 (which contains much of the information contained in IEEE C37.48.1) has been published, we would be able to replace C37.48 and C37.48.1 by a suitably amended version of the TR. Amendments would include some nomenclature changes (e.g. "melting time" rather than "pre-arcing time") and an annex to cover exclusively North American practices not otherwise included (e.g. slant-rated cutouts). This approach has been endorsed by the sub-committee in the past, and would enable the daunting task of revising C37.48 before it expires, to be completed in the necessary time-frame. It was emphasized that the resulting document would be an IEEE C37.4x standard.
   - A report on the progress of polymer insulator testing was received from Chris Lettow (chair of the Task Force). Most of the time since the last meeting has involved preparation of a proposal for a project to test Polymer Cutouts by NEETRAK. The project was being "pitched" by Frank Lambert that day (which accounted for his absence). If the project is accepted it is hoped that significant data will be available within 12-18 months. This will make it a little tight to get proposals in PC37.41 before balloting is planned (the PAR suggests balloting in November 2015, leaving possibly only two meetings to finalize polymer testing in the standard). With our present standard due to expire in 2018 we may need a PAR extension, to include polymer

testing, but we will cross that bridge when we come to it. Anyone interested in joining the Task force should contact the TF Chair or the Subcommittee Chair.

- Most of the meeting was spent in reviewing changes to PC37.41 Draft 4c, circulated in August, based on inputs from several members. Agreement was reached on new definitions for "rated current" of devices and new wording for sealing tests on liquid immersed current-limiting fuses (based on the IEC version of our testing). There was general agreement on the need for specifying closing angles for Expulsion fuse test series 4 (primarily for cutout testing) and members agreed to study this and make proposals before the next meeting. There was less agreement on the need for formalizing certain statements in the present standard, concerning the bursting of fuse-link auxiliary tubes on the same Test series 4, with actual test requirements. Again members are to study proposals that have been made, and be prepared for further discussion at the next meeting.

9. Report of liaison to other committees

ER&P Committee – J. G. Leach:

There is some concern that most of the papers submitted to IEEE under the "Switchgear" category are of rather poor quality (only 2 of about 30 papers were from the USA, and most were from university "paper mills"). Members of Switchgear Committee are encouraged to submit papers, and it is felt that new and significantly revised standards may be a good source of material, written by one or more members of Working Group. Those who are not yet senior IEEE member are encouraged to apply (now it is an on-line process and relatively easy). We also need more Fellows, and Leslie Falkingham has agreed to be our new "Fellows" liaison.

10. Report of IEC activities - J. G. Leach:

John reported that The IEC HV Fuses subcommittee SC32A had met in Warsaw in June, and that IEC 60549 Ed. 2 "High-voltage fuses for the external protection of shunt power capacitors" was published in April 2013, while Technical Report IEC/TR 62655 "Tutorial and application Guide for high-voltage fuses" was issued in May 2013. He pointed out that new members of the US Technical Advisory Group to SC32A were always required, and if your company is a member of ANSI no fees are involved.

The full TAG report is attached as Annex "A".

11. Unfinished business – None

12. New business – Neville Parry reported that PERL (Professional Electrical Apparatus Recyclers League) had attained ANSI Accredited Standards Developer Status. Apparently fuses, carrying a PERL label had been sold without the knowledge of the original manufacturer, resulting in a loss of commercial trace, and loss of warrantee. The observation was made that, in the past, both IEEE and IEC had received requests to include, in standards, methods of testing "used" fuses to check for integrity. Both organizations had been unable to comply, as no completely reliable test methods were known.

13. Next meetings:

Spring 2014 (5 May – 8 May) Disney Contemporary Hotel, Orlando, FL.

Fall 2014 (September 21-25), Renaissance Hotel, Asheville, NC

Spring 2015, (April 26 – 30), Tradewinds Island Resorts, St. Pete Beach, FL

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

14. Adjournment – 2:30PM

Annex "A" IEC report

IEC Report 2013-2 April 2013 to September 2013

From: Dr. John G. Leach, Technical Advisor SC32A, September 12th 2013

Summary
Since the April 2013 report there has been a meeting of SC32A and MT3 Warsaw, Poland on Monday June 24th and Tuesday June 25th 2013. The CDV for the amendment to IEC 60282-1 closed after the meetings and resolution of comments is underway. IEC 60549 Ed. 2 "High-voltage fuses for the external protection of shunt power capacitors" was published in April 2013, while Technical Report IEC/TR 62655 "Tutorial and application Guide for high-voltage fuses" was issued in May 2013. At the SC meeting it was decided that MT3 would work on proposed items for a full revision of IEC 60282-1 in order to prepare a reasonably mature document to support a Review Report to be distributed later.

A meeting of MT3 will be held in London on March 20 and 21 to pursue the revision of IEC 60282-1 (CL fuses).

SC32A
This was the first time the subcommittee had met since Tel Aviv (2009-10) The attendees were:

SC32A Chairman: Mr. Mariusz WILNIEWCZYC (Poland)
SC32A Secretary: Mr. Didier FULCHIRON (France)
IEC Central Office: Andrew REDGATE
Guest: Sephen LAWSON, TC32 Chairman

Country	Name	First Name	Status
Germany	STEIN	Norbert	Head of delegation
Poland	CWIDAK	Krzysztof	Head of delegation
Spain	PEREZ-QUESADA	Juan-Carlos	Head of delegation
United Kingdom	HANDCOCK	Harold	Head of delegation
United States of America	LEACH	John	Head of delegation

Mr. Andrew Redgate presented the latest news about the organisation of the IEC. A particular focus was made on the new organisation of TC32, with information by Stephen Lawson, Chairman of TC32: TC32 will group the topics common to the three sub-committees and perform actual work, a new MT3 has been created by TC32 to undertake vocabulary management. This organisation could be also an opportunity to group the plenary meetings of the TC and its SCs.

Mr. Norbert Stein, convenor of the MT3, presented a report on the activity of the MT3. MT3 completed the revision of IEC 60644 and worked on the amendment to IEC 60282-1, CDV of which currently under vote.

Dr. John Leach, convenor of the MT7, presented a report on the revision of the IEC 60549 which led to the publication of Edition 2 last April.

Mr. Norbert Stein, convenor of the WG6, presented a report on the activity of the group. The group finished its work, and as any technical report, this publication will need to be reaffirmed, or updated, or withdrawn, every three years. Therefore, it is proposed to transform the WG6 into a Maintenance Team.

The subcommittee considered the possibility of starting the work on IEC 60282-1 Ed.8, based on inputs from MT3. Stability date of the IEC 60282-1 is proposed to be 2016 as stated in the CDV currently under vote. If all the proposed items are addressed, it will lead to a new edition, not an amendment. Due to the number of items, and the early stage of the ideas/proposals, it was decided that the MT could work on a preparatory stage without launching any formal revision project. Therefore the MT3 will work on the proposed items, in order to prepare a reasonably mature document to support a Review Report to be distributed later. NCs are invited to nominate in MT3 right now any expert who would like to participate

The subcommittee considered cancelling PWI 32A-34-1 "Commutating current limiting devices, with integral fuses, for high current rating applications" (no work done to date). Market players do not seek for any standard for this application which is currently a niche market. Furthermore, the technologies and knowledge involved in such functions are beyond the scope of the SC32A. It was decided to cancel this PWI in the program of work of SC32A.

The status of documents after IEC/TR62655 was discussed.

IEC 60282-1 will already be adapted by publication of Amendment 1, which states that the application section is to be cancelled (see 32A/302/CDV).

IEC 60282-2 will need to be updated, but the publication of IEC/TR 62655 is not enough to justify a revision work on this standard. It is then postponed until other need appears for revision.

IEC 60549 does not need update; no application section would need update in this standard.

IEC 60644 will need to be updated, but the publication of IEC/TR 62655 is not enough to justify a revision work on this standard. It is then postponed until other need appears for revision.

IEC/TR 60787 is completely covered by the IEC/TR 62655: it could be withdrawn now (with a decision for shortening the currently available stability date from 2016 to 2013). The IEC webstore should, in such case, state that the publication is superseded by the IEC/TR 62655. The IEC publication department will be requested to establish the link on the Webstore to the new Technical Report. It was therefore decided that the stability date of IEC/TR 60787 is brought forward to 2013, and the decision made to withdraw this publication as its technical content has been incorporated in IEC/TR 62655. IEC publication department is requested to make IEC/TR 62655 seen as superseding IEC/TR 60787

Further topics of interest:

The Convenor of MT4 stated that there is no open question reported to the MT, and no work is going on, nor forecasted. The US stated that IEEE is working on the polymeric insulators matter when such insulators are used for HV fuse cut-outs; it could lead to a request for updating the IEC 60282-2 to deal with the same topic. But when relating to insulators themselves, SC36A should be the relevant body. Discussion around the table did not provide clear direction and further information about the IEEE concern will be needed before considering launching any work.

It was reported that some market players are concerned about d.c. fuses, especially for railways applications. The topic could be addressed also by TC9, and it does not seem that delegates see the possibilities of gathering experts on such topic. It was found that a standard already exists, prepared by TC9: the IEC 60077-5. It was also reminded that the question came as well for low voltage fuses and that no progress has ever been made on the topic.

Liaisons- additional information was provided about the change in structure of TC17: TC17 will become a high voltage only committee, the two low voltage sub-committees being transferred into a new TC. The documents and concerns common to switchgear and assemblies will be dealt with at the TC level. Among these topics, TC17 will establish a WG about vocabulary and a liaison between this group and MT3 of TC32 could be wise.

Date and place of the next meeting: TC32 Chairman proposed investigating the possibility to have grouped meetings, with SCs, during the General Meeting in Minsk (2015), but it seemed too early for SC32A considering the work program. Germany volunteered for organizing a plenary meeting if needed. The German delegate will ask for a possible participation of TC32 and Sub-Committees during the General Meeting planned in Germany in 2016.

Maintenance Team 3 met in Warsaw, Poland, Tuesday June 24th 2013. The attendees were:

Harold Handcock
John Leach (Convenor IEC 32A MT7)
Juan-Carlos Perez-Quesada (Convenor IEC 32A MT4)
Norbert Stein (Convenor IEC 32A MT3 and WG6)
Mariusz Wilniewczyc (Chair SC32A)
Andrew Redgate (IEC Central Office) - Guest

It was noted that document 32A/302/CDV of the amendment has been issued. While no official comments to the CDV are yet known, it was reported that two comments are known from countries that have representatives in the MT (Germany and the USA). These "anticipated" comments were therefore discussed.

It was noted that MT3 is instructed to examine IEC 60282-1 and make proposals for a revision, based on identified topics (circulated to National Committees before the meeting) as well as any other changes identified as being desirable (some others being identified during the SC 32A meeting). This will be done before an official program is begun (when there is limited time to make changes).

John Leach had prepared a draft version of Edition 8 by incorporating the material from the amendment into Ed. 7.0 and making some suggested changes. A long discussion ensued over the long-standing issue of Series II rated voltages (which do not match the values in IEC 60038 “Standard voltages”, those in IEC 62271-1 (switchgear common clauses), or those used in current IEEE fuse standards). Two main issues emerged:

i. System I voltages are based on insulation voltages (the same values as "highest voltage for equipment" in IEC 60038, and the same as many, although not all, voltages used for switchgear). In IEC 60038, the "highest voltage for equipment" for series II (North America and some other countries) lists many voltages very close together (e.g. 13.2 kV, 13.97 kV and 14.52 kV) and so the list, as is, is not suitable for fuse "preferred values". Consequently while most fuse series II voltages used in North America are based on insulation voltages, and line up with IEC Switchgear series II values, two IEEE fuse standard voltages are based on operational considerations (one a common but “non-preferred” system voltage and the other a common single phase voltage). It was decided that this should be explained in a note to Table 3.

ii. When fuses using series II voltages are tested using the standard IEC 87% of rated voltage for TD1 and TD2, they are a) often not then suitable for use with standard North American single phase voltages, and b) obviously not suitable for the “matching” non-effectively earthed three phase systems. Because of this IEEE standards require all testing be at 100% of rated voltage, but fuses tested to the minimum requirements of IEC standard 80282-1 often cannot be used without requiring the next highest insulation class fuse to be used. It was therefore agreed by those present that there should be an additional requirement that fuses tested using series II voltages should be tested at 100% rated voltage for all tests. There would be no change for fuses tested to series I voltages.

There was some discussion on how to handle the maximum permitted temperatures in table 6 when fuses are used in transformer like situations. A note similar to that being used in the amendment for liquid temperature was proposed and agreed by those present. An additional proposal for wording to indicate that fuses tested at 50 Hz are suitable for use at 60Hz, and vice-versa was deemed acceptable by those present.

Each item in the original list of topics for consideration, in addition to others identified during the SC32A and MT3 meeting was examined and a lead person or persons identified to bring proposals to our next meeting. This is appended as Annex A below.

Date and place of next meeting: It was hoped that any comments to the CDV could be handled by correspondence, avoiding another meeting so close to this one. It was felt that an appropriate time for the next meeting would be March/April 2014, giving members enough time to make progress on the items proposed for consideration for the revision of IEC 60282-1. Dates of Thursday and Friday March 20 and 21st in London were suggested and later confirmed.

John Leach, 9/12/13

Annex A

List of proposed topics to be considered in a revision of IEC 60282-1.

Version 1.2, generated at the MT3 meeting in Warsaw, Poland, Tuesday June 24th 2013

Item	Description	Lead
1	Revision of Table 6 (temperatures) and fuse current rating system to address applications at surrounding temperatures over 40 °C.	Leach
2	Review fuse current rating system for special applications.	Leach
3	Review temperature measurement methods for fuses and ambient temperature.	Haas
4	Review insulated/bare conductor requirements and fuse position for test circuits (including fuses in enclosures).	Haas
5	Review definitions to ensure compatibility with other standards (particularly switchgear standards).	Everyone
6	Review test circuit parameters and test requirements for compatibility (e.g. comparison of power factor and peak current requirements).	Stein
7	Clarification of the equivalence of 50 Hz and 60 Hz testing.	Leach
8	Review series II voltages in all associated tables/table notes.	Leach
9	Review virtual time usage and specifications for TCC (with comparison to IEC 60282-2 and 60269)	Handcock, Perez-Quesada, Leach
10	Review striker requirements including thermal strikers (including switch-fuse requirements).	Wilniewczyc, Haas, Perez-Quesada, Martincic
11	Review 87% testing requirements in relation to non-effectively earthed systems and comparison with testing methods for expulsion fuses in 60282-2. (see 8)	Leach, Perez-Quesada,
12	Review parallel fuse homogeneous test requirements.	Leach
13	Use of "effectively"/”non-effectively" earthed rather than solid etc. per Switchgear usage.	Stein
14	Incorporate remaining parts of IEC 60644 into IEC 60282-1	Leach
15	Look for other issues	Everyone

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 to be requested in 2014 for 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 2014
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