

## **Minutes of Meeting**

WG: C37.09 Standard Test Procedure for AC High-Voltage Circuit Breakers with Rated Maximum Voltage above 1000V

Chair: Xi Zhu

Vice Chair: Victor Hermosillo

Secretary: Mike Skidmore

### **First Session (8:00 AM – 9:45 AM) – October 10, 2017**

Location: Portland, ME

Participants: 27 Members

53 Guests

(40 total members in WG - Quorum requirement met)

#### **Greetings, Introductions, Members & Guests Sign in**

All members and guests introduced themselves

Session #1 attendance list circulated and the chair asked all attendees to sign the roster and provide affiliation if not noted on the roster.

Chair presented the agenda (Document 161) in central desktop

Chair discussed IEEE-SA Patent Policy Compliance and showed slides. During the meeting, he made a verbal call for patents to the working group. No participants raised any concerns for a potential patent claim during the meeting.

#### **MOM Approval**

MOM (meeting of minutes) are posted and sent out via email after the spring meeting. This is listed in central desktop as (Doc.150). Charlotte Meeting posted and emailed on 5/16/2017.

The chair asked if there are any updates or concerns with the spring 2017 MOM.

The meeting minutes for Charlotte unanimously approved.

The chair reviewed the agenda document 161.

#### **Xi Review Summary of Project Status**

- Initial ballot completed (July 26-Aug. 25, 2016)
  - 88% returned (114 votes), 80% approved (84 affirmative votes),
  - 22 negative (1 without comment), 8 abstained. 492 comments
  - Public viewing (60 days) completed and no comments received.
  - CRC / straw man disposition sent to WG members and guests on 10/3/2016
  - Around 40 comments discussed in WG meeting
  
- 1st Recirculation
  - Balloted (March 28 – April 12, 2017). 91% returned (118 votes).
  - As of now, 87% approved (96 affirmative votes), 14 negative (5 without new comment), 8 abstained. 128 comments
  - CRC / straw man disposition sent to WG members and guests on 4/21/2017
  - Selected comments discussed in Charlotte WG meeting on April 25, 2017
  - Most comments resolved. A few left to be followed up after meeting by Task Force members. Ref. to MOM.
  - Draft 2.7 incorporated dispositions (as of now) sent to WG members and Guests on 10/5/17 through IEEE-SA.

IEEE-SA CentralDesk Website:

<https://ieee-sa.imeetcentral.com/login?eid=&rurl=%252Fhome%252F>

160+ documents archived in Central Desk. A few important ones:

Doc 000 - Master WG Document List

Doc 153 – Draft 2.6 sent out for 1st recirculation ballot

Doc 157f – 1st Recirculation Disposition (working document sent to WG)

WG Member List review

The chair and secretary discussed requirements for Membership

- 1) Need to keep WG membership update for voting purpose
- 2) WG membership modified according to IEEE-SA policy below
- 3) In case of mistake, please contact WG chair/VC/Secretary

The chair showed a slide listing 40 WG members. If others believe, the membership is not accurate to let the Chair or Secretary know and they will review membership status.

PAR extended and will expire December 31, 2018

C37.09-1999 document is also set to expire December 31, 2018

The chair outlined the plan for C37.09:

- Finalize Recirculation 1 comment dispositions (we have a few left to be discussed in this meeting)
- Recirculation 2 in one month (November, 2017)
- IEC copyright second request with specifics
- Recirculation 3/Coordination/Alignment with PC37.04
- Submission to RevCom after Spring 2018 meeting

There were no objections from the WG for this plan.

The chair moved to discuss open items:

Reference documents for this meeting (sent 10/9/17 through IEEE-SA):

- - Draft 2.6 Rec. 1 balloted - (Doc.153)
- - Disposition (Rec.1) details – (Doc. 157f)
- - Draft 2.7 working document – (Doc. 159b)

Left over from previous meeting:

1. Dielectric Test number of shots -- John Webb presentation? (r01-113 from John)
2. Service capability current accumulation at calibration – (r01-120 from John) Denis & Xi
3. Characteristics of mechanical travel tolerance & applicability to vacuum breakers. -- Leslie, John, Bob Behl, Edgar? (r01-101/111/57 from Robert Goodin, Robert Behl, Edgar Dullni)
4. Mechanical endurance test Table 14 – Dan Schiffbauer (r01-107/99/106 from Robert Behl, Robert Goodin)
5. Temperature rise test procedures using C37.100.1 – (Mr. Dave Stone email comments) Hua Liu, John Webb, Dave Stone, Denis Dufournet.

New items submitted by Victor H. (10/2/17 email)

OP1 duty test condition

Dielectric test as condition check

### **Comments Resolution Discussion**

#### **1.) R01-113 – Dielectric Test**

Dielectric Test number of shots -- John Webb presentation.

Delete clause 4.5.2 Test Conditions. Use symmetry if applicable, test only two-phases. John Webb's proposal is to test all three phases.

Concern with 3x9 the probability of finding flaw is low. 10% is not detectable.

Bob Behl if two phases OK, then good design.

If 15 shot series then the probability is higher.

Denis Dufournet same discussion in IEC 62271-100. Two phases OK if 15 shots, three phases if 3x9.

John Webb to write wording

Sushil: dielectric tests on breakers with independent pole operation mounted in individual separate structures are performed individually. Should be made clear in document for breaker with individual frames per phase.

IEEE Representative: Please explain procedure. Will balloting group have a chance of reviewing before change is made? Suggested to make text available before recirculation.

Xi Chair: Working Group detail disposition and thus revised new draft document will be sent to ballot members. Ballot group members can comment and vote on the new document.

## **2.) R01-120 – Service Capability current accumulation count**

Service capability current accumulation at calibration – (r01-120 from John) Denis & Xi

Xi and Denis prepared proposal.

John Webb's comment was about include wording for calibration tests in accumulation.

Chair Xi showed the changes in the new draft and explained new wording.

Roy Alexander questioned if the meaning of medium arcing time is clear enough.

Chair asked Denis to check and clarify if there is ambiguity.

## **3.) R01-101/111/57 – mech. condition after short circuit test**

Characteristics of mechanical travel tolerance & applicability to vacuum breakers. -- (r01-101/111/57 from Robert Goodin, Robert Behl, Edgar Dullni)

In 4.9.6.6 Condition of circuit breaker after test

Original comment was made about the applicability of the mechanical travel curve to vacuum breakers. Robert Behl proposed wording for this clarification and Edgar modified the wording slightly for better clarity.

Chair Xi: The proposed wording would be added to the end of clause a).

## **4.) R01-107/99/106 – mechanical endurance test table 14**

Mechanical endurance test Table 14 – Dan Schiffbauer (r01-107/99/106 from Robert Behl, Robert Goodin)

Dan communicated with the commenters on the mechanical endurance test. The complaint was about the unnecessary tests in Table 14. Agreement is to remove them from Table 14 by removing the check marks on Dataset 3.

Dataset was removed from corresponding column.

**5.) Temperature rise test procedures referencing to C37.100.1 – (Mr. Dave Stone email comments) Hua Liu, John Webb, Dave Stone, Denis Dufournet.**

4.4 continuous current carrying tests.

Dan made proposal. 4.4.2 and 4.4.3 Removed all items that are already in C37.100,1. 4.4.6 and 4.4.7 also edited.

Dave Stone proposes to refer to quote C37.100.1-2017 and then let IEEE editors check.

Denis: What was background of decision to include temperature rise limits in C37.04?

Xi explains, it is not obvious that this table has to be included in document describing test procedures. Keep this table in C37.04.

Stephen Cary Chair of C37.04 confirmed this decision. Distinguish between bare aluminum and copper bolted connections and include same format as table in C37.100.1.

**New items submitted by Victor H. (10/2/17 email)**

**New – 6) OP1 duty test condition**

Denis Dufournet: IEC OP1 only if there is no critical current evidenced by a change in minimum arcing time (5 ms or longer). Keep the note but reword it to make reference to 4.13.6. Denis to prepare wording.

Should match the note in Table 11.

**New – 7) Dielectric test as a condition check**

4.8.5.4.3 compared to 4.9.6.7 is redundant.

Chair Xi to remove line 2396-2411 of Draft 2.6 from 4.9.6.7 .

All topics discussed in first session. The chair asked the WG if there are any other open items that need to be discussed. No comments and no additional topics added to agenda.

Second Session (10:15 AM to noon) will be cancelled since all topics covered in session #1

Meeting adjourned

Meeting Roster for Session #1, Session #2 cancelled – Portland, ME

First Name	Last Name	Role	Company	10/10/2017 Portland ME
Syed Shahab Uddin	Ahmed	Guest	Siemens Energy Inc	
Roy	Alexander	Member	RWA Engineering	X
Natasha	Alvarado	Guest	IEEE Standards Association	
Mauricio	Aristizabal	Member	ABB	X
Brad	Armstrong	Guest	Meramec Instrument Transformer Co.	X
Koustubh	Ashtekar	Guest	Eaton Corporation	X
Aasim	Atiq	Guest	Siemens Industry	
Roy	Ayers	Guest	Nashville Electric Service	
Katrin	Baeuml	Guest	Schneider Electric	
Paul	Barnhart	Guest	Underwriters Laboratories	
Amildo	Barrio	Guest	Parsons	
George	Becker	Guest	POWER Engineers	
Robert	Behl	Guest	ABB	X
Jean-Marc	Biasse	Guest	Schneider Electric	
J	Billings	Member	John S Billings Consulting	
Marcus	Bonner	Guest	GE	
Anne	Bosma	Member	ABB AB	
Douglas	Brandt	Guest	Eaton Corporation	
Cody	Brehm	Guest		
Jeffrey	Britton	Guest	Phenix Technologies, Inc.	
Jeffrey	Brogdon	Guest	Georgia Transmission	
Steven	Brown	Guest	Allen & Hoshall	
Raymond	Browning	Guest	FirstEnergy Corp.	
John	Brunke	Guest	Dr. John H. Brunke, P.E.	
Arben	Bufi	Member	Hitachi T&D Solutions, Inc.	X
Ted	Burse	Guest	Powell Industries, Inc	X
Eldridge	Byron	Member	Schneider Electric	X
Donald	Cantrelle	Guest	Georgia Power	
Gilbert	Carmona	Guest	Southern California Edison	
Stephen	Cary	Member	GE Energy Management	X
Steven	Chen	Member	Eaton Corporation	X
Wayne	Cheng	Guest	B C Hydro	
Vincent	Chiodo	Guest	HICO	
Jeonghwan	Cho	Guest	HICO America	
Andrew	Chovanec	Guest	GE Power	X
Chih	Chow	Member	PEPCO	X

Michael	Christian	Guest	ABB	
Roggero	Ciofani	Guest	Altalink	
Robert	Cohn	Guest	Powercon Corp.	
Lucas	Collette	Member	Mitsubishi Electric	
Dave	Collette	Guest	Mitsubishi Electric	
Michael	Crawford	Member	Mitsubishi Electric	X
Jason	Cunningham	Guest	Hitachi HVB, Inc.	X
David	Dart	Guest	NOJAPower	
Jerod	Day	Guest	Vacuum Interrupters, Inc.	
Daniel	Delfino	Guest	General Electric	X
Patrick	Di Lillo	Member	Consolidated Edison Co. of NY, Inc.	X
Jeffrey	Door	Guest	H-J Family of Companies	X
Denis	Dufournet	Member	Retired	X
Edgar	Dullni	Guest	ABB	
Bernie	Dwyer	Guest	PECO	
John	Eastman	Guest	INCON	X
Alexander	Ebbert	Guest	HICO America	
Ken	Edwards	Member	Consultant	
Doug	Edwards	Guest	Siemens Industry, Inc.	
Tanner	Esco	Guest	Eaton Corporation	
Leslie	Falkingham	Member	Vacuum Interrupters Limited	
David	Feldmann	Guest	HICO America	
Howard	Fennell	Guest	Nashville Electric Service	
Philip	Fentress	Guest	Memphis Light, Gas & Water Div	X
Thomas	Field	Guest	Engergy	
Sergio	Flores	Guest	Schneider Electric Inc. USA	X
Robert	Foster	Guest	Megger	X
Paul	Fox	Guest	Schneider Electric	X
Raymond	Frazier	Guest	Ameren	X
Richard	Frye	Guest	Eaton	
Didier	Fulchiron	Guest	Schneider-Electric	
Sivakumar	Ganesh	Guest	ENMAX Corporation	
Douglas	Giraud	Member	Powell Industries	X
Anne	Good	Guest	Netshape Technologies, Inc.	
Paul	Grein	Guest	Circuit Breaker Sales, Co, Inc, - GroupCBS	
Martin	Greschner	Guest	HIGHVOLT Prueftechnik Dresden GmbH	
John	Hall	Guest	Tennessee Valley Authority	X
Jeffrey	Hanson	Guest	Schneider Electric	



Helmut	Heiermeier	Member	ABB	X
Christian	Heinrich	Guest	Siemens AG	
Charles	Hendrickson	Guest	Arizona Public Service Company	
Jeremy	Hensberger	Guest	Mitsubishi Electric Power Products Inc.	X
Victor	Hermosillo	Vice-Chair	GE Grid Solutions	X
William	Higinbotham	Guest	EA Technology LLC	
Tyler	Holp	Guest	Eaton	
Alexander	Hoover	Guest	Siemens Industry	X
Jingxuan (Joanne)	Hu	Member	RBJ Engineering Corporation	
Carl	Hummel	Guest	HICO America	
Jennifer	Hunter	Guest	MEPPI	X
Roy	Hutchins	Member	Southern Company Services	X
Todd	Irwin	Member	GE Grid Solutions	X
Anton	Janssen	Guest	Liander	
Joseph	Jasinski	Guest	ITC Holdings Corp.	X
David	Johnson	Guest	Self-Employed	
Cory	Johnson	Guest	Bonneville Power Administration	X
Jacob	Joseph	Guest	Toshiba International Corporation	
Wolfgang	Jung	Guest	Siemens AG	
Mangu	Kang	Guest	HICO America	
Jayamali	Kasige	Guest	Crown Technical Systems	
Thomas	Keels	Guest	Salt River Project	
Nicholas	Keihn	Guest	Schneider Electric	X
Amir	Khosravi	Guest	BC Hydro	X
JaeHyun	Kim	Guest	HICO America/Hyosung	
Jinho	Kim	Guest	HICO America	
SangTae	Kim	Guest	HICO/HYOSUNG	X
Boris	Kogan	Guest	Schneider Electric	
Sandeep	Kulkarni	Guest	CG	
Carl	Kurinko	Guest	ABB Inc.	
James	Lagree	Guest	Eaton	
Stephen	Lambert	Guest	Shawnee Power Consulting, LLC	
Scott	Lanning	Guest	S&C Electric	X
Matthew	Lawrence	Guest	Doble Engineering	

Brad	Leccia	Guest	Eaton	X
HaeKyu	Lee	Guest	HICO America	
Shawn	Lee	Guest	HICO America	
David	Lemmerman	Guest	PECO/Exelon	
Werner	Lesse	Guest	Siemens AG	
Paul	Leufkens	Guest	Power Projects Leufkens	
Wangpei	Li	Guest	Eaton	
Qian	Li	Guest	Powertech Labs INC.	
Hua Ying	Liu	Member	Southern California Edison	X
Albert	Livshitz	Member	CE Power Solutions	X
Russell	Long	Member	Retired	
Antonio	Mannarino	Guest	PSE&G	
Vincent	Marshall	Guest	Southern Company Services	X
Gary	Martin	Guest	Entergy	
Ricardo	Martinez	Guest	CFE-LAPEM	
Peter	Marzec	Guest	S&C Electric Co.	
Joel	Mathewson	Guest	Siemens	
Frank	Mayle	Guest	Technibus, Inc.	
James	McBride	Guest	JMX Services, Inc.	
Neil	McCord	Guest	KEC Precision	X
Timothy	McGee	Guest	Siemens Energy	
Steven	Meiners	Guest	GE	X
Peter	Meyer	Guest	S&C Electric Company	
Dave	Mitchell	Guest	Dominion	X
Arthur	Molden	Guest	AMEESCO	
Terry	Monahan	Guest	Schneider Electric	
Tom	Mulcahy	Member	Dominion Virginia Power	X
Volney	Naranjo	Guest	GERS USA	
Raj	Nayar	Guest	Siemens Energy Inc.	
Jason	Neal	Guest	HICO America	
Jeffrey	Nelson	Guest	Tennessee Valley Authority	
Joachim	Oemisch	Guest	Siemens AG	
T	Olsen	Guest	Siemens Industry, Inc.	
Nicholas	Orlando	Guest	IEEE-SA	
Miklos	Orosz	Guest	Schneider Electric	
Justin	Palmer	Guest	ELECTRONSYSTEM MD	
Molson	Parvin	Guest	CB&I	
Shawn	Patterson	Guest	US Bureau of Reclamation	
Thomas	Pellerito	Member	DTE Energy	X
Alan	Peterson	Guest	Utility Service Corporation	X
Andrew	Peterson	Guest	ABB	X
Lise	Phan	Guest	Parcific Gas and Electric	

			Company	
John	Phouminh	Guest	PEPCO HOLDINGS, INC.	X
Anton	Poeltl	Guest	ABB	
Iulian	Profir	Guest	Rockwell Automation	
Ahmad	Qasem	Guest	Bechtel	
Syed	Rahman	Guest	The United Illuminating Company	
Samala Santosh	Reddy	Guest	Powell Industries	
Frank	Ricard	Guest	FirstPower Group LLC	
Anthony	Ricciuti	Member	Eaton Corporation	X
Bobby	Rich	Guest	Dominion Virginia Power	X
Dave	Riffe	Guest	Westinghouse Electric Company	
Julian	Rizo	Guest	Xcel Energy	
Brian	Roberts	Guest	Southern States, LLC	
Jon	Rogers	Guest	Siemens Energy, Inc	X
Ian	Rokser	Guest	Eaton Corp	X
Ben	Rosenkrans	Guest	Eaton Corporation	
Roderick	Sauls	Member	Southern Company Services	
Victor	Savulyak	Member	DNV GL KEMA Laboratory	
Robert	Sazanowicz	Guest	The United Illuminating Company	
Daniel	Schiffbauer	Member	Toshiba International Corporation	
Carl	Schneider	Guest	Schneider Electric	
Carl	Schuetz	Member	American Transmission Company (ATC)	X
Jon	Schumann	Guest	American Transmission Company	
Moin	Shaikh	Guest	Siemens	X
Jesse	Shank	Guest	POWER Engineers	X
Devki	Sharma	Member	Consultant	
Harish	Sharma	Guest	Southern Company	
Sushil	Shinde	Member	ABB Inc.	X
John	Shullaw	Guest	Retired	
Dean	Sigmon	Member	Eaton Corporation	X
Sunita	Singh	Guest	Bechtel OG&C	
Michael	Skidmore	Secretary	AEP	X
Christopher	Slattery	Guest	FirstEnergy	X
Robert	Smith	Member	Retired	X
Hongbiao	Song	Guest	GE	

Erin	Spiewak	Guest	IEEE	
Kresimir	Starcevic	Guest	DNV GL KEMA Laboratories	
Don	Steigerwalt	Guest	Duke Energy	X
David	Stone	Guest	DTS Technical Services	X
Donald	Swing	Guest	Hubbell Power Systems	
Dragan	Tabakovic	Guest	Meramec Instrument Transformer Co.	
Humayun	Tariq	Guest	American Electric Power	
Henk	te Paske	Guest	KEMA Netherlands	X
Jey	Thayalan	Guest	Schneider Electric	X
Michael	Titus	Guest	Schneider Electric	
Jean-Marc	Torres	Guest	Eaton Corporation	
Vernon	Toups	Member	Siemens	
Francois	Trichon	Guest	Schneider Electric	
Richard	Trussler	Guest	Schneider Electric	
James	van de Ligt	Member	CANA High Voltage Ltd.	X
Nick	Vonfeldt	Guest	Ameren Missouri	X
Michael	Wactor	Guest	Powell Industries, Inc	
Wes	Wadsworth	Member	Hitachi HVB, Inc.	
Jeffrey	Ward	Guest	Doble Engineering Company	X
Robert	Warren	Guest	DNV GL - KEMA Laboratories	
John	Webb	Member	ABB	X
Casey	Weeks	Guest	Siemens Energy	X
Jan	Weisker	Guest	Siemens AG	X
Jerry	Wen	Guest	BC Hydro	X
William	Wilkie	Guest	Eaton	
Matthew	Williford	Guest	Schneider Electric	
Barnes	Wilson	Guest	Avista Utilities	
Torsten	Wirz	Guest	ABB AG	X
Joseph	Wisnewski	Guest	UL LLC	
Terry	Woodyard	Member	Siemens Industry Inc.	
Ang	Xiao	Guest	3M company	X
Larry	Yonce	Guest	Eaton Corporation	X
Dong Sun	Yoon	Guest	HICO America	
Richard	York	Guest	Mitsubishi Electric Power Products Inc.	X
Li	Yu	Guest	Eaton Corporation	
Jiong	Zhang	Guest	MEPPI	
Jiong	Zhang	Member	MEPPI	
Wei	Zhang	Guest	Hitachi HVB, Inc.	X
Xi	Zhu	Chair	GE Energy Management	X

'X' - individual was at the meeting in Portland