Minutes of **C37.09 Amendment 1 Working Group**
Spring 2023 meeting
April 18, 2023, Clearwater, Florida

Attendance 84 people were in attendance
31 members participated (of 36 at that date)

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Welcome/Call to Order
Jan Weisker called the meeting to order at 2:00 pm

Introductions & Membership
The attendees introduced themselves along with their affiliation.

84 people attended the meeting.
31 members out of 36 were present for the meeting which met the quorum requirements.

Mandatory Information
The essential patent claim slide was presented. No essential patent claims were voiced during the call.
IEEE Copyright slide was presented. The guidelines for working group meetings was presented.

Approval of Minutes of last Meeting
Motion to approve – John Webb
2nd – Mike Skidmore

Review of the Item List and work done so far

A list of items received so far was displayed to the working group.

Item 3 and 17
Both of these items were similar.

There was a proposal for these to be combined in Fall '22 meeting.
Andy Chovanec presented the proposal.
Change T_I and T_{II} to T_{I1} and T_{I2}. Reduced the soaking time. Eliminated the second tightness test.

There was a question regarding the temperatures. Standard is -30 C but the test would be to the design specifications.

There was a question whether the lower temperature should be defined and whether it will be required to start at the lower temperature and move to the higher. It was discussed that going either direction should be acceptable.

There was a question whether it included GIS. The standard for indoor GIS is -5 C. Jan will check to see if it is required for GIS.

Carl Schuetz asked whether the leak test should be performed at both temperatures. The proposal is to only require it at the lowest temperature. The thinking is that the higher temperature would have a lower leak rate.

There was a question whether liquification of the gas at the lower temperature would affect the leak test. It was stated that it depended on the method used. There is always some liquefaction at the low temperatures.

A statement was made that leaving T_{l1} and T_{l2} undefined would allow either temperature to be performed first.

Devki Sharma asked how the bushings are accounted for in the leak test. The circuit breakers are tested with bushings, but there is no terminal load applied. He asked whether terminal load should be applied during the tightness test. Discussion occurred which leaned to the difficultly of how to apply terminal load during the test.

Jeremy Hensberger stated that not testing at the second temperature would not account for any damage that occurred at the lower temperature.

Jeremy Hensberger and Devki Sharma will work on a proposal to modify the test procedure.

Andy Chovanec also presented the proposal for the high temperature test. Neil McCord suggested that the test be compared to IEC to make sure that the IEEE test doesn't require a second test from the IEC test.

- Neil McCord and Andy Chovanec will read the IEC to harmonize the tests.

Items 14 and 15
There was discussion whether capacitor switching should be kept in .09 or moved to 100.2. The proposal is to leave it in .09 until 100.2 can be modified to include these requirements. Once it is in 100.2, it would then be removed from .09. Neil McCord stated his belief is that this is already in 100.2.

The working group agreed to the proposal for Items 14 and 15.

- Neil McCord volunteered to write up a letter to 100.2 and report back to this group.

Item 13
Dan Schiffbauer presented a proposal to check vacuum integrity after type test duty.
There a currently three different possibilities.

- Power frequency test in a reduced gap
- Contact force measurement
- Perform breaking test with 10% short circuit test

Pat Di Lillo stated there is also a need to be able to perform a field test after breakers have been in service.

Neil McCord asked if the current 80% requirement would be sufficient to verify the vacuum integrity.

There was discussion on details of the contact force measurement and whether loss of vacuum can be measured when the VI is attached to the breaker mechanism.

- Leslie Falkingham, Neil McCord, Dan Schiffbauer, Federico Di Michele, and Harm Bannink will work on a proposal to include how to verify vacuum integrity .

Item 27
Should the voltage condition check parameters be aligned between IEC and IEEE.

Dan Schiffbauer presented the differences.

Dan asked that volunteers confirm what he found.

Jan Weisker, Leslie Falkingham, and Dan Schiffbauer volunteered to confirm these differences, investigate why they exist, and develop a proposal if they should align.

Item 29 and 30
Viktor Savulyak, Federico Di Michele, Harm Bannink, and Jan Weisker will work on a proposal to submit to the working group.

Item 24
Mike Crawford proposed to add language of clarifying accessible spots for temperature measurements.

There was discussion regarding this item. There was an example given that some designs require damaging the device to take measurements.

There was a question whether it should be specified how close to the joint the measurement should be taken. Discussion was held that it is not possible to uniformly define a distance used to differences in breaker designs.

- Mike Crawford and John Webb volunteered to rephrase the wording togalgenbach.

Item 28
Viktor Savulyak presented that labs have trouble with achieving t3 for TRV testing and use IEC rules regarding TRV requirements for T10 and possibly T30 when they can't meet the t_3 requirement at fast speeds. The proposal is to allow testing to be a lowest possible time t_3 not to exceed T60 time.

John Webb proposed that we include the language of IEC in case the test can't be met.

Viktor Savulyak will modify the language and make a proposal. The WG agreed that this item will be included in the amendment.

Item 29
Victor Savulyak, Jan Weisker and Harm Bannink volunteered to make a proposal for the inclusion of different stresses to be combined for verifying the service capability duty.

Time Schedule
A planned time schedule was presented to the working group. The PAR expires December 31, 2025.

Adjourn the Meeting
Motion Leslie Falkingham
2nd Carl Schuetz

Minutes of **C37.09 Amendment 1 Working Group**
Spring 2023 meeting
April 18, 2023, Clearwater, Florida

Meeting adjourned at 3:48 pm.

Reported by:
Chris Jarnigan

Attachments:

(1) WG membership and attendance

(2) Agenda

(3) Item List after meeting

Role	First Name	Last Name	Company Name	S22	F22	S23
Chair	Jan	Weisker	Siemens Energy	x	x	x
Secretary	Christopher	Jarnigan	Southern Company	x	x	x
Voting member	Koustubh	Ashtekar	JST POWER EQUIPMENT	x	x	x
Voting member	Herman	Bannink	G&W Electric	x	x	x
Voting member	Arben	Bufi	Meiden America	x	x	x
Voting member	Eldridge	Byron	Schneider Electric	x		
Voting member	Stephen	Cary	2 Phase Solutions	x		x
Voting member	Steven	Chen	Eaton Corporation	x	x	x
Voting member	Michael	Christian	ABB	x	x	x
Voting member	Lucas	Collette	Duquesne Light Co.	x	x	x
Voting member	Michael	Crawford	Mitsubishi Electric	x	x	x
Voting member	Sergio	Flores	Schneider Electric US, Inc.	x	x	x
Voting member	Robert	Hanna	JST Power Equipment	x	x	
Voting member	Jeremy	Hensberger	Mitsubishi Electric	x	x	x
Voting member	Todd	Irwin	GE Grid Solutions	x		x
Voting member	Thomas	Keels	kEElectric Engineering,	x	x	
Voting member	Carl	Kurinko	Hitachi Energy	x	x	x
Voting member	Vincent	Marshall	Southern Company	x	x	x
Voting member	Neil	Mc Cord	KEC Precision LLC	x	x	x
Voting member	Kevin	McGlown	JST Power Equipment	x		
Voting member	Sumitabha	Pal	Schneider Electric	x	x	x
Voting member	Craig	Polchinski	Mitsubishi Electric Power	x		
Voting member	Anthony	Ricciuti	EATON	x	x	x
Voting member	Leonel	Santos	Schneider Electric	x		x
Voting member	Victor	Savulyak	KEMA	x	x	x

Voting member	Carl	Schuetz	ATC	x	x	x
Voting member	Jeffrey	Scott	Ameren	x	x	x
Voting member	Devki	Sharma	Self affiliated	x		x
Voting member	Michael	Skidmore	AEP	x	x	x
Voting member	Vernon	Toups	Siemens Energy Inc	x	x	x
Voting member	Jacob	Walgenbach	Siemens	x	x	x
Voting member	John	Webb	ABB	x	x	x
Voting member	Casey	Weeks	Siemens Energy, Inc.	x	x	x
Voting member	Terry	Woodyard	Siemens Industry, Inc.	x	x	x
Voting member	Richard	York	Mitsubishi Electric	x	x	x
Voting member	Samuel	Zaharko	MEPPI	x	x	x
Non-voting member	Anatoly	Akhunov	HICO America			x
Non-voting member	Samuel	Andris	KEMA Labs		x	x
Non-voting member	Mauricio	Aristizabal	Hitachi Energy		x	x
Non-voting member	Ganesh	Balasubramanian	Eaton			x
Non-voting member	Andreas	Bartels	Powell Industries			x
Non-voting member	Andy	Beckel	Xcel Energy			x
Non-voting member	George	Becker	Power Engineers Inc.		x	x
Non-voting member	Bob	Betti	JST POWER EQUIPMENT			x
Non-voting member	Elizabeth	Bray	Southern Company	x		
Non-voting member	Jeff	Brodgen	Georgia Transmssion			x
Non-voting member	Adam	Brooks	Duke Energy			x
Non-voting member	John	Brunke	Power Engineers	x		
Non-voting member	Craig	Bryant	Duke Energy		x	x
Non-voting member	Ted	Burse	Powell Industries, Inc.		x	
Non-voting member	Andrew	Chovanec	Power Grid Components	x	x	x
Non-voting member	Dave	Collette	Mitsubishi Electric			x
Non-voting member	Jason	Cunningham	Southern States, LLC	x	x	x
Non-voting member	Patrick	Di Lillo	Consolidated Edison Co.	x	x	
Non-voting member	Federico	Di Michele	CESI SpA		x	x
Non-voting member	Jeff	Door	H-J			x
Non-voting member	Max	Eastman	Black & Veatch			x
Non-voting member	Leslie	Falkingham	VIL			x
Non-voting member	Bruce	Fennell	Nashville Electric Service	x		
Non-voting member	Peter	Glaesman	PCORE Electric Company		x	
Non-voting member	Nadia	HASNAOUI	GE		x	

Non-voting member	Victor	Hermosillo	GE Grid Solutions		x	
Non-voting member	Benjamin	Hohnstadt	DTE	x		
Non-voting member	Jennifer	Hunter	MEPPI		x	x
Non-voting member	Roy	Hutchins	Georgia Power Company	x	x	
Non-voting member	Bharatwaj	Jagadeesan	Southern States LLC	x		
Non-voting member	Darin	Jensen	Meiden American		x	
Non-voting member	Dave	Johnson	Self affiliated			x
Non-voting member	Hyoungjin	Joo	Hyundai Electric & Energy		x	
Non-voting member	SangTae	Kim	HICO America		x	x
Non-voting member	Yun Seong	Kim	KERI			x
Non-voting member	Dwight	Krause	Black & Veatch			x
Non-voting member	Patil	Lalit	Eaton			x
Non-voting member	Chang Hoon	Lee	HYOSUNG	x	x	x
Non-voting member	Yong Woo	Lee	KERI			x
Non-voting member	Leo	Lopez	WIKA Instrument	x	x	x
Non-voting member	Adrian	Lopez	Powell Industries		x	
Non-voting member	Peter	Marzec	S&C Electric	x		
Non-voting member	Paul	Masterson	Meiden America	x		x
Non-voting member	Steven	May	Southern Company		x	x
Non-voting member	Kenneth	McKinney	Underwriters		x	
Non-voting member	David	Mitchell	Southern States	x	x	x
Non-voting member	Andrew	Monroe	Southern Company	x		
Non-voting member	Raj	Nayar	Siemens	x		x
Non-voting member	Fernando	Ordein	Dominion Energy			x
Non-voting member	Miklos	Orosz	Circuit Breaker	x	x	
Non-voting member	John	Owen	Powertech Labs			x
Non-voting member	Mark	Pattison	H-J			x
Non-voting member	Thomas	Pellerito	DTE ENERGY	x		
Non-voting member	Mark	Peterson	Xcel Energy			x
Non-voting member	Isaac	Pounders	Meiden			x
Non-voting member	Rakesh	Ranjan	Esgee Technologies Inc.	x		
Non-voting member	Aaron	Rexroad	Meiden			x
Non-voting member	Brian	Roberts	Southern States			x
Non-voting member	Ryan	Rowe	TCI			x
Non-voting member	Oscar	Salas	Duke Energy			x
Non-voting member	Alex	Salinas	Doble/Vanguard			x

Non-voting member	Jennifer	Santulli	IEEE-SA	x		
Non-voting member	Daniel	Schiffbauer	Toshiba International	x	x	x
Non-voting member	Aleksandr	Serguyenko	Tavrida			x
Non-voting member	Matthew	Siena	Duke Energy	x		
Non-voting member	Hall	Sigmon	Siemens			x
Non-voting member	R Kirkland	Smith	TCARA		x	
Non-voting member	Donald	Steigerwalt	Duke Energy		x	x
Non-voting member	Ben	Sux	Nashville Electric Service			x
Non-voting member	Donnie	Swing	Powell			x
Non-voting member	Truett	Thompson	Siemens		x	
Non-voting member	Joseph	Usner	AEP	x	x	x
Non-voting member	Jeffrey	Ward	Doble Engineering Co			x
Non-voting member	Dan	Wolfe	MEPPI		x	x
Non-voting member	Marcus	Young	Mitsubishi Electric		x	x
Non-voting member	Mina	Youssef	Eaton Corporation		x	
Non-voting member	Li	Yu	EATON		x	x
Non-voting member	Lukas	Zehnder	Hitachi Energy	x		
Non-voting member	Gigi	Zhang	HICO America			x
Non-voting member	Xin	Zhou	Eaton		x	
Non-voting member	Danish	Zia	UL LLC	x		

PC37.09 Standard Test Procedure for AC High-Voltage Circuit Breakers with Rated Maximum Voltage above 1000V - Amendment 1

Chair: Jan Weisker

Secretary: Chris Jarnigan

IEEE Switchgear Meeting, April 18, 2023 – Clearwater/FL

Agenda

- Welcome/Call to Order
- Introductions & Membership
- Mandatory Information
- Approval of Minutes of last Meeting
- Review of the Item List and work done so far
- Time Schedule
- Adjourn the Meeting

Introduction & Membership

Chair: Jan Weisker

Secretary: Chris Jarnigan

Members

Koustubh	Ashtekar
Herman	Bannink
Arben	Bufi
Eldridge	Byron
Stephen	Cary
Steven	Chen
Michael	Christian
Lucas	Collette
Michael	Crawford
Sergio	Flores
Robert	Hanna
Jeremy	Hensberger

Todd	Irwin
Thomas	Keels
Carl	Kurinko
Vincent	Marshall
Neil	Mc Cord
Kevin	McGlown
Sumitabha	Pal
Craig	Polchinski
Anthony	Ricciuti
Leonel	Santos
Victor	Savulyak

Carl	Schuetz
Jeffrey	Scott
Devki	Sharma
Michael	Skidmore
Vernon	Toups
Jacob	Walgenbach
John	Webb
Casey	Weeks
Terry	Woodyard
Richard	York
Samuel	Zaharko

34 Members - Quorum = 17

Red names officially excused

Mandatory Information

https://development.standards.ieee.org/myproject/Public/mytools/mob/slideset.pdf

https://standards.ieee.org/wp-content/uploads/2022/02/ieee-sa-copyright-policy.pdf

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- Prior to presentation or submission, you shall notify the Working Group Chair of previously Published material and should assist the Chair in obtaining copyright permission acceptable to IEEE SA.
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IEEE SA COPYRIGHT POLICY

- The IEEE SA Copyright Policy is described in the IEEE SA Standards Board Bylaws and IEEE SA Standards Board Operations Manual
  - IEEE SA Copyright Policy, see
    Clause 7 of the IEEE SA Standards Board Bylaws
    https://standards.ieee.org/about/policies/bylaws/sect6-7.html#7
    Clause 6.1 of the IEEE SA Standards Board Operations Manual
    https://standards.ieee.org/about/policies/opman/sect6.html
- IEEE SA Copyright Permission
  - https://standards.ieee.org/content/dam/ieee-standards/standards/web/documents/other/permissionltrs.zip
- IEEE SA Copyright FAQs
  - https://standards.ieee.org/faqs/copyrights/
- IEEE SA Best Practices for IEEE Standards Development

http://standards.ieee.org/content/dam/ieee-standards/standards/web/documents/other/best_practices_for_ieee_standards_development_051215.pdf

- Distribution of Draft Standards (see 6.1.3 of the SASB Operations Manual)
  - https://standards.ieee.org/about/policies/opman/sect6.html

PARTICIPANTS HAVE A DUTY TO INFORM THE IEEE

- Participants shall inform the IEEE (or cause the IEEE to be informed) of the identity of each holder of any potential Essential Patent Claims of which they are personally aware if the claims are owned or controlled by the participant or the entity the participant is from, employed by, or otherwise represents

- Participants should inform the IEEE (or cause the IEEE to be informed) of the identity of any other holders of potential Essential Patent Claims

Early identification of holders of potential Essential Patent Claims is encouraged

WAYS TO INFORM IEEE

- **Cause an LOA to be submitted to the IEEE SA (patcom@ieee.org); or**
- **Provide the chair of this group with the identity of the holder(s) of any and all such claims as soon as possible; or**
- **Speak up now and respond to this Call for Potentially Essential Patents**

If anyone in this meeting is personally aware of the holder of any patent claims that are potentially essential to implementation of the proposed standard(s) under consideration by this group and that are not already the subject of an Accepted Letter of Assurance, please respond at this time by providing relevant information to the WG Chair

OTHER GUIDELINES FOR IEEE WORKING GROUP MEETINGS

- **All IEEE SA standards meetings shall be conducted in compliance with all applicable laws, including antitrust and competition laws.**
  - **Don't discuss the interpretation, validity, or essentiality of patents/patent claims.**
  - **Don't discuss specific license rates, terms, or conditions.**
    - Relative costs of different technical approaches that include relative costs of patent licensing terms may be discussed in standards development meetings.
      - **Technical considerations remain the primary focus.**
  - **Don't discuss or engage in the fixing of product prices, allocation of customers, or division of sales markets.**
  - **Don't discuss the status or substance of ongoing or threatened litigation.**
  - **Don't be silent if inappropriate topics are discussed. Formally object to the discussion immediately.**

For more details, see *IEEE SA Standards Board Operations Manual*, clause 5.3.10 and *Antitrust and Competition Policy: What You Need to Know* at http://standards.ieee.org/develop/policies/antitrust.pdf

PATENT-RELATED INFORMATION

The patent policy and the procedures used to execute that policy are documented in the:

- ***IEEE SA Standards Board Bylaws***
  (http://standards.ieee.org/develop/policies/bylaws/sect6-7.html#6)
- ***IEEE SA Standards Board Operations Manual***
  (http://standards.ieee.org/develop/policies/opman/sect6.html#6.3)

Material about the patent policy is available at *http://standards.ieee.org/about/sasb/patcom/materials.html*

If you have questions, contact the IEEE SA Standards Board Patent Committee Administrator at patcom@ieee.org

Approval of MoM

Minutes of C37.09 Amendment 1 Working Group
Fall 2022 meeting
October 18, 2022, Burlington, Vermont

Attendance 63 people were in attendance
26 members participated (of 35 at that date)
37 guests participated

==========

Welcome/Call to Order
Jan Weisker called the meeting to order at 4:15 pm

Introductions & Membership
The attendees introduced themselves along with their affiliation.

26 members out of 35 were present for the meeting which met the quorum requirements.

Mandatory Information
The essential patent claim slide was presented. No essential patent claims were voiced during the call.
IEEE Copyright slide was presented.

Approval of Minutes of last Meeting
Motion to approve - John Webb
2nd – Andy Keels

Review of the Item List and work done so far
Since the Spring 2022 meeting proposals for several items have been received.

There was an opportunity for someone to request current limiting HVCB to be added to the standard. There was no response.

A list of items received so far was displayed to the working group.

Item 3
Ted Burse explained Item number 3 by giving a presentation. (Dual-rating, low-temperature test sequence) TL and TLL are not defined in the standard.
Mauricio explained that TL and TLL were options to give the manufacturer an opportunity to test at two ratings during the same cycle.
Victor elaborated the IEC requires the cycle to be repeated completely to get a second rating.

Discussion settled that the procedure has a purpose but needs to be better defined.

Victor Hermosillo, Mauricio Aristizabal, Sergio Flores, and Ted Burse agreed to draft a proposal to address Item 3.

Item 3 and item 17 (Andrew Chovanec) to commonly propose a "low and high temperature test" subclause

Item 4
Section 4.5.5 – Proposal to ignore breakdowns that occur during preliminary tests as in 4.5.5 to be extended to 4.5.6, 4.5.7, 4.8.5.4.3
There were no objections to the addition.
Originally it was written for medium voltage which is why it wasn't present.

Item 5
Inductive load switching. Currently it is not addressed in C37.04.
Discussion proposed that Item 5 should be included in 37.04

Project Status PC37.09 Amd1

1) First Meeting, April 12, 2022, Orlando/FL
2) Proposals for several items received
3) Second Meeting, October 18, 2022, Burlington/VT
   Proposals discussed and some already agreed
4) Further proposals received

Item List Review

#3 + #17

3	Technical	84	4.3.18	Low-Temp Test – TL and TLL are neither defined in .09 or referenced in .04	Define TL and TLL	Ted Burse	Ted Burse	in progress	Issue clarified by Ted's presentation, common item with #17
17	Technical	87	4.14	mention of high temp tests but not defintion/procedure	Check C37.016-2018, clause 7.11.5.3 for common clause	Andrew Chovanec	Henning Milnikel, Andrew Chovanec	in progress	cooperate with people of item #3, review wht is existing in C37.016, come up with common new text

Proposed changes to Environmental Test Procedure

Low-Temp Testing

- Changed T_{LL} & T_L to T_{L1} and T_{L2}
- Separated steps for validation of T_{L1} and T_{L2} for clarity
- No technical changes made to procedure for validation of first (or single) low-temp rating (T_{L1})
- Modified requirements for the validation of the 2nd low temp (T_{L2}) to avoid unnecessarily long tests
  - Reduced the required soak time from 24hr to 8hr for the validation of the 2nd low Temp (T_{L2})
    - According to historical test data, 8hr is sufficient to reach temperature
  - Eliminated the requirement to perform tightness tests at the 2nd low Temp (T_{L2})
    - Performing this only at the lower T_{L1} provides the necessary leakage rate validation

Steps j through n need only be performed if a dual low-temperature rating test is being performed. Otherwise, proceed to step o.

j) With the circuit breaker in the closed position and all heater circuits energized, the test cell temperature shall be increased to the second minimum test temperature (T_{L2}). The circuit breaker shall remain in the closed position for 8 h after the test cell temperature has stabilized at T_{L2}.

k) After 8 h at T_{L2}, the low-temperature operation sequence shall be performed.

l) With all test object thermocouples and density monitors stabilized, all auxiliary heater circuits are de-energized for 2 h. As the test object approaches minimum functional density (if applicable), perform a single O operation. Record the occurrence of alarm and block operation conditions (if applicable). Record temperature conditions within the mechanism and control enclosures. Reenergize all heater circuits. Record the recovery from block operation and alarm conditions (if applicable). Record the temperature recovery within mechanism and control enclosures.

m) The circuit breaker shall remain in the open position for 8 h at T_{L2}.

n) After 8 h at T_{L2}, the low-temperature operation sequence shall be performed.

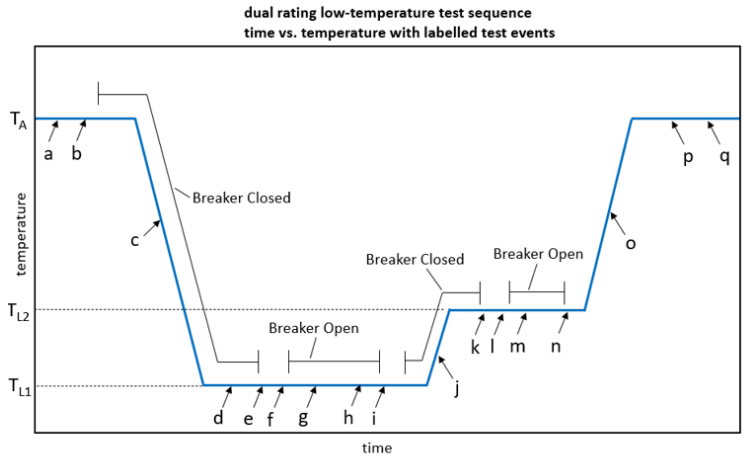


Figure 16—Dual-rating, low-temperature test sequence

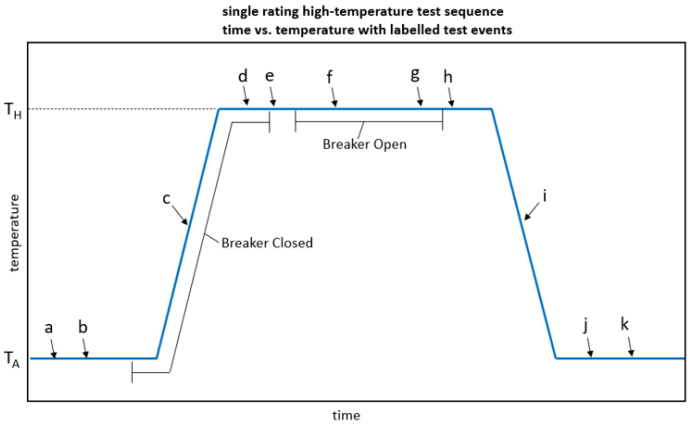
Proposed changes to Environmental Test Procedure

High-Temp Testing

- Mimicked procedure from Low-temp tests
- Did not include a dual rating option for high temperature testing – did not seem necessary
- Specified a maximum allowable leakage rate of 3 x F_P for high-temperature tests 40°C and above
  - Matches requirement from IEC 62271-1 (2017)
- Incorporated references to High-temperature tests in sections:
  - 4.13.7 - “Low and high-temperature test object and conditions”
  - 4.13.10 - “Low and High-temperature qualification criteria”
  - 4.13.11 - “Low and high-temperature test report requirements”

Table 14—High-temperature test sequence

Item	Description	Operating sequence	Dataset (see Table 10)	Supply voltage	Operating energy	Number of operating sequences
a	Pretest Checks	—	3	—	—	—
b	Pretest Operations [b]	O, C, O–t_{cc}–CO	2	Minimum	Rated	2
				Maximum	Rated	2
				Rated	Rated	2
c	Circuit Breaker CLOSED – Heat Up					
d	Tightness Test					
e	High Temperature Operations	O, C, O–t_r–CO	4	Rated	Rated	Variable [c]
f	Circuit Breaker OPEN					
g	Tightness Test					
h	High Temperature Operations [a]	C–3 min–O	4	Rated	Rated	1
		CO–3 min	4			3
		C–t_a–O–t_a	None			46
i	Decreasing Temperature Operations [a]	C–t_a–O–t_a–C–30min–O–t_a–C–t_a–O–30min	4	Rated	Rated	Variable [d]
j	Posttest Operations [b]	O, C, O-t_r–CO	2	Minimum	Rated	2
				Maximum	Rated	2
				Rated	Rated	2
k	Posttest Checks	—	3	—	—	—



Item List Review

#14+15

Predefined operations for test duty 1 and 2 of three-phase LC/CC tests class C2. but there is no maximum number of tests if breakers prevent accurate control.		Jan Weisker	Harm Bannink, Neil McCord, Jan Weisker	in progress	possibility to cover this in C37.100.2 to be evaluated	Recommended to update 09, for new revision move to 100.2
Predefined operations for test duty 1 and 2 of three-phase LC/CC tests class C1. There is no maximum number of tests if breakers prevent accurate control. The 6 distributed shots on one polarity is achieved by step of 30˚. This won't be possible in three phase tests. The second 6 shots for maximum arcing time at another polarity.		Jan Weisker	Harm Bannink, Neil McCord, Jan Weisker	in progress	Red part of the comment is covered by Corrigendum already possibility to cover this in C37.100.2 to be evaluated	Recommended to update 09, for new revision move to 100.2

- **Predefined operations for test duty 1 and 2 of three-phase LC/CC tests class C2. but there is no maximum number of tests if breakers prevent accurate control. (To be in line with the IEC)**
- **proposed text additional to clause 4.10.9.1.7:**
  If the behavior of the circuit-breaker prevents accurate control, where the number of tests is defined for 24 the total number of tests is limited to 36 for each test-duty.
- **proposed text additional to clause 4.10.9.1.8:**
  If the behavior of the circuit-breaker prevents accurate control, where the number of tests is defined for 48 the total number of tests is limited to 72 for each test-duty.
- **proposed text additional to clause 4.10.9.1.9:**
  If the behavior of the circuit-breaker prevents accurate control, where the number of tests is defined for 80 the total number of tests is limited to 100 for each test-duty.
- **proposed text additional to clause 4.10.9.1.10:**
  If the behavior of the circuit-breaker prevents accurate control, where the number of tests is defined for 120 the total number of tests is limited to 159 for each test-duty.
- **Added for C1 to cover #15**
- **proposed text additional to clause 4.10.9.1.10:**
  If the behavior of the circuit-breaker prevents accurate control, where the number of tests is defined for 24 the total number of tests is limited to 36 for each test-duty.

Item List Review

#18

- Keep .09 up to date
- Refer for cap sw to .100.2 in new edition

Item List Review

#13

13	Technical	56	4.8.6.6	there are no requirements to test the integrity of Vacuum Interrupter (VI) unit in an enclosure filled with SF6	Jan Weisker	Harm Bannink, Henning Milnikel, Eldrige Byron	in progress	Reason behind proposal Input from Dan to be made more clear, new proposal to be prepared,

Proposed text additional to clause 4.8.4.3 (original text from the STL guide IEC 62271-200):

For vacuum interrupter Circuit-Breakers places in an SF6-filled enclos… …all be verified by performing a short-circuit interrupting test.

If performed three phase, the T10 circuit shall be used … …ce and the load neutrals earthed. If performed single phase, the T10 circ… …and each pole shall be tested separately. The TRV shall be as for the th… …ondition with a first-pole-to-clear factor of 1,0.

A successful interruption i… …idence that the vacuum interrupter integrity is good.

New Input from Dan Schiffbauer

Chairman'

I think T10 …pecific here. Why not go for IEC approach, at least 50 % of rated voltage and at least 10 % of rated short circuit current.

Secondly, "SF6 filled" is also too specific.

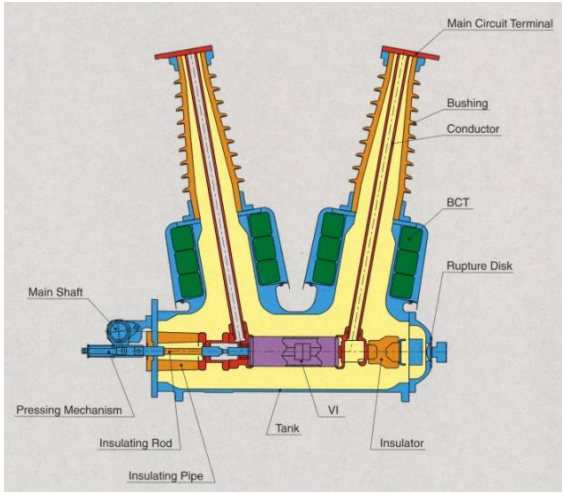
Does the voltage condition check adequately prove vacuum integrity after a type test duty?

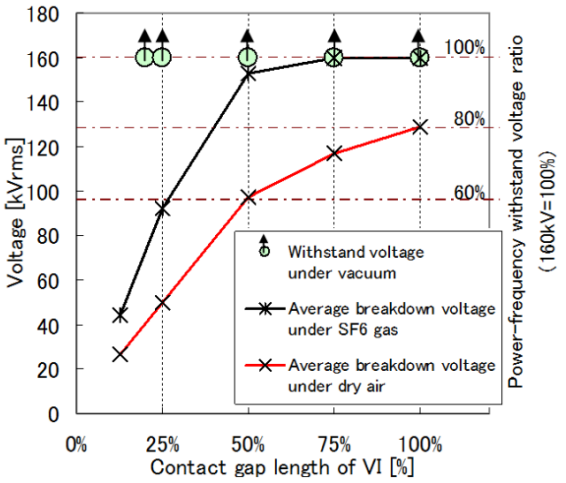
- A compromised VI could allow external gaseous insulation into the vacuum enclosure.
- If the dielectric strength of the contaminant gas is sufficiently high, the device could pass a standard VCC in the open position (80% PF, 60% LI, etc.)

- After short-circuit duties that require a condition check, IEC 62271-100 (6.102.2.9) states that if interrupting units are placed within an insulating fluid with characteristics *other than air at atmospheric pressure* then:
  - Perform breaking test with at least 10% rated short circuit current and at least 50% rated voltage in addition to the VCC.

- But what about after switching, mechanical or environmental tests?
  - All (usually) require a condition check after the test, but a breaking test is not always practical.
  - CIGRE technical brochure 589 provides a proposal:
    - Perform the VCC with a vacuum contact gap reduced to 25% of the normal open gap.
    - The data at lower-right is from an 84 kV VI indicating that even when compromised with SF6 contamination, a 25% gap would fail the VCC.
    - The same test with dry air might just pass the VCC with a 100% gap.

Open question - Would the 25% proposal still apply to higher rated VI's?





Item List Review

#27

27	Technical	A closely related item is the voltage condition check defined in IEEE Std C37.09 (2018) and IEC 62271-100 (2017). They are not the same. I wanted to ask for some discussion during the meeting about why they are not the same and if we could consider alignment with -100.	Dan Schiffbauer	Input from Dan

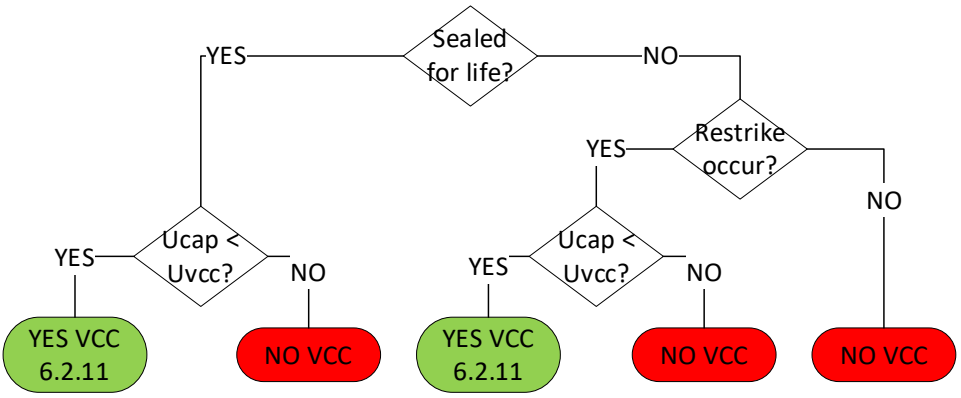
- "A closely related item is the voltage condition check defined in IEEE Std C37.09 (2018) and IEC 62271-100 (2017). They are not the same. I wanted to ask for some discussion during the meeting about why they are not the same and if we could consider alignment with -100. "

Several opportunities exist to align the voltage condition check parameters between IEC and IEEE.

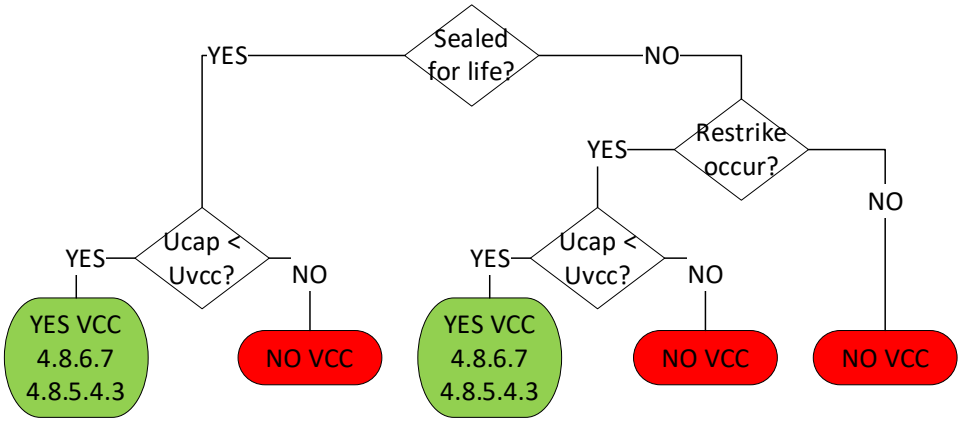
	IEC 62271-100 (2017)					IEEE C37.09 (2018)					
	6.2.11 Voltage test as a condition check after making breaking switching					4.8.5.4.3 Condition check after meeting service capability tests					4.8 Short circuit making and breaking 4.8.6 Condition of circuit breaker tested 4.8.6.7 Voltage withstand tests
U_r	Rated Dry Power Frequency Withstand	Rated Lightning Impulse	Rated Switching Impulse	Waveform	Series	Rated Dry Power Frequency Withstand	Rated Lightning Impulse	Rated Switching Impulse	Waveform	Series	
< 72.5	80%	-	-	-	1 min	80%	-	-	-	1 min	
72.5	80%	-	-	-	1 min	-	80%	-	Std	5x ±	
						-	60%	-	T10	5x ±	
123	-	60%	-	Std or T10	5x ±	-	80%	-	Std	5x ±	
						-	60%	-	T10	5x ±	
145	-	60%	-	Std or T10	5x ±	-	80%	-	Std	5x ±	
						-	60%	-	T10	5x ±	
170	-	60%	-	Std or T10	5x ±	-	80%	-	Std	5x ±	
						-	60%	-	T10	5x ±	After L90 or T100s refer to 4.8.5.4.3
245	-	60%	-	Std or T10	5x ±	-	80%	-	Std	5x ±	
						-	60%	-	T10	5x ±	
300	-	-	80%	Std or T10	5x ±	-	80%	-	Std	5x ±	
						-	60%	-	T10	5x ±	
362	-	-	80%	Std or T10	5x ±	-	-	80%	Std or T10	5x ±	
420	-	-	80%	Std or T10	5x ±	-	-	80%	Std or T10	5x ±	
550	-	-	90%	Std or T10	5x ±	-	-	80%	Std or T10	5x ±	
800	-	-	90%	Std or T10	5x ±	-	-	80%	Std or T10	5x ±	
> 800	-	-	90%	Std or T10	5x ±	-	-	80%	Std or T10	5x ±	

Specifically after capacitive switching tests, the conditions for performing a post-test VCC are already aligned between 62271-100 (2017) and C37.09 (2018)

IEC 62271-100 (2017)



IEEE C37.09 (2018)



Specifically after mechanical and environmental tests:

IEC 62271-100 (2017)

- If insulation integrity across the open gap cannot be verified visually then,
  - If Ur ≤ 245 kV – 80% of rated dry power frequency withstand across the isolating distance.
  - If Ur ≥ 300 kV – 100% of rated dry power frequency withstand across the isolating distance.
- GIS and DTB are treated differently in order to stress insulation paths to the grounded enclosure.

Table 38 – Test requirements for voltage tests as condition check for GIS and dead tank circuit-breakers

No. of series connected breaks	Arrangement of the current path	Circuit-breaker position		
		Open (one side)	Open (other side)	Closed
Single	Symmetrical	Y	N	Y
	Asymmetrical	Y	Y	N
Multi	Symmetrical	Y	N	Y
	Asymmetrical	Y	Y	Y
Y: necessary to apply voltage. N: not necessary to apply voltage.				

IEEE C37.09 (2018)

- No condition related to the ability to determine insulation integrity visually.
- LTB, GIS, DTB all treated the same.
- Table 10: 80% of rated dry power frequency withstand according to the procedure described in 4.5.4.1.

Item List Review

#24

24	Technical		4.4.5		clarify accessible spots for temperature measurements	John Webb	J. Webb, Henning M., Mike Crawford, Jake

C37.09-2018 4.4.5 comment - Measurement of temperatures, clarify accessible spots for temperature measurements

- Section 4.4.5 currently states "The measuring device shall be located at a point where measurement of the hottest accessible spot can be made. Measure ments shall be made at junction points of insulation and conducting parts to prevent exceeding temperature limits of the insulation. Holes that destroy the effectiveness of the test (such as in multiturn coils) shall not be drilled."
- I suggest the following rewrite of that statement: "The measuring device shall be located at a point where the hottest accessible spot can be made without damaging the device or adversely affecting the monitored temperature or current flow. The measurement spot shall be chosen based on analysis, engineering judgement, etc... Measurements shall be made at junction points of insulation and conducting parts to prevent exceeding temperature limits of the insulation. Holes that destroy the effectiveness of the test (such as in multiturn coils) shall not be drilled."

Item List Review

#28

28	Technical			Laboratories around the world have been having trouble meeting the TRV requirements specified for Test Duty T10 in IEEE C37.04, and some seem to have problems with T30. This has occurred primarily at 27 and 38 kV, when labs have not been able to meet the small values of time t3. European and Asian labs automatically apply rule from IEC 62271-100 even when they test to IEEE C37.09 and C37.09 or C37.04 does not allow this. Some laboratories use this rule and do not even make an effort to achieve the shortest time. Propose is to add not exact, but similar	T30 In case that small values of time t3 cannot be met, the shortest time that can be met shall be used. The values used shall be stated in the test report. T10 In case that small values of time t3 cannot be met, it shall be permissible to use a higher value for t3, as long as it is less than the value specified for the T60. The values used shall be stated in the test report.	Victor Savulyak	Victor Savulyak			Input from Victor

- Sorry for the late email. This problem was discussed yesterday during STLNA meeting with suggestion to address it in C37.09. This problem came not from the laboratory, but from the client.

- Laboratories around the world have been having trouble meeting the TRV requirements specified for Test Duty T10 in IEEE C37.04, and some seem to have problems with T30. This has occurred primarily at 27 and 38 kV, when labs have not been able to meet the small values of time t3. European and Asian labs automatically apply rule from IEC 62271-100 even when they test to IEEE C37.09 and C37.09 or C37.04 does not allow this.
- In case that small values of time t3 cannot be met, the shortest time that can be met shall be
- used. The values used shall be stated in the test report.

- Some laboratories use this rule and do not even make an effort to achieve the shortest time. Propose is to add not exact, but similar statement to C37.09 for T10 duty.
- In case that small values of time t3 cannot be met, it shall be permissible to use a higher value for t3, as long as it is less than the value specified for the T60. The values used shall be stated in the test report.

Item List Review

#29 + #30

29	Technical	54	4.8.5.4	As already discussed on the phone, I would like to bring in a topic regarding IEEE C37.09 subclause 4.8.5.4 Service capability and circuit breaker condition. It would be good to get a better clarification regarding procedure to demonstrate the service capability like I^2*t needs to be reached to successfully demonstrate the service capability.		Denis Baecker				
30	Technical	54	4.8.5.4.3	And please consider the “can be performed” in 4.8.5.4.3 Condition check after meeting service capability tests. “Can be” is a bit weak in this case.		Denis Baecker				

- As already discussed on the phone, I would like to bring in a topic regarding IEEE C3709 subclause 4.8.5.4 Service capability and circuit breaker condition.
- It would be good to get a better clarification regarding procedure to demonstrate the service capability like I^2*t needs to be reached to successfully demonstrate the service capability.
- And please consider the “can be performed” in 4.8.5.4.3 Condition check after meeting service capability tests. “Can be” is a bit weak in this case.

4.8.5.4.3 Condition check after meeting service capability tests

A test circuit breaker insulation condition check can be performed after current accumulation duty specified in the service capability duty requirements of IEEE Std C37.04. The voltage withstand test can be performed by direct method in the high-voltage laboratory or indirect method using synthetic circuit in the high-power laboratory as listed as follows. The direct method is preferred if the high-voltage laboratory is close to the

Schedule PC37.09 Amd1

1) First meeting, April 12, 2022, Orlando/FL
2) Second meeting, October 18, 2022, Burlington/VT
3) Collect proposals through 2022/2023
4) Review proposals/open points during F22 / S23 / F23
5) Prepare D1
6) Form ballot group by ~~end~~ mid of ~~2023~~ 2024
7) Initial Ballot ~~beginning~~ mid of 2024
8) Discuss Comments during ~~S24~~ F24 meeting/form CRG
9) Prepare D2
10) 1st recirculation and comment resolution before ~~F24~~ S25
11) Prepare D3
12) 2nd recirculation and finalization in ~~2024~~ 2025

(PAR expires December 31, 2025)

Motion to Adjourn

Thank you!

Item List - Amendment to C37.09

No	Category	Page	Sub-clause	Comment	Proposed Change	Proposer	To be prepared by	Status	Remark F22	Remark S23
1	Technical			Define Time interval between tests	as per IEC 62271-100; 6.106.1 (future 7.106.1)	Ted Burse			Find person in charge	
2	Technical			T100a procedure is generally accepted	but give more guidance if circuit-breaker is not stable for min arcing time	Ted Burse			Find person in charge	
3	Technical	84	4.3.18	Low-Temp Test – TL and TLL are neither defined in .09 or referenced in .04	Define TL and TLL	Ted Burse	Andrew Chovanec, John Webb, Jeremy Hensberger, Devki Sharma, Neil Mc Cord	in progress	Issue clarified by Ted's presentation, common item with #17	Input from Andrew Chovanec,rewrite proposal to harmonize with IEC and to allow flexible test procedure
9	Technical			Requirement to perform all interruption tests in a minimum volume enclosure?	Requiremnt to be added?	John Webb	John Webb			
10	Technical			Double Earth Fault in IEEE	Test necessary?	John Webb	John Webb, Jan Weisker			
13	Technical	56	4.8.6.6	there are no requirements to test the integrity of Vacuum Interrupter (VI) unit in an enclosure filled with SF6		Jan Weisker	Harm Bannink, Henning Milnikel, Eldrige Byron, Neil McCord, Frederico di Michele, Leslie Falkingham, Dan Schiffbauer	in progress	Reason behind proposal to be made more clear, new proposal to be prepared,	Input from Dan, Necessity of integrity check generally accepted
14	Technical	66	4.10.9.1.7	Predefined operations for test duty 1 and 2 of three-phase LC/CC tests class C2. but there is no maximum number of tests if breakers prevent accurate control.		Jan Weisker	Harm Bannink, Neil McCord, Jan Weisker	done	possibility to cover this in C37.100.2 to be evaluated	Recommended to update 09, for new revision move to 100.2
15	Technical	70	4.10.9.2.7	Predefined operations for test duty 1 and 2 of three-phase LC/CC tests class C1. There is no maximum number of tests if breakers prevent accurate control. The 6 distributed shots on one polarity is achieved by step of 30˚. This won't be possible in three phase tests. The second 6 shots for maximum arcing time at another polarity.		Jan Weisker	Harm Bannink, Neil McCord, Jan Weisker	done	Red part of the comment is covered by Corrigendum already possibility to cover this in C37.100.2 to be evaluated	Recommended to update 09, for new revision move to 100.2
16				Testing covering kpp=1.3 & kpp=1.5; Previously, IEEE always considered kpp=1.5 covering kpp=1.3. How to cover metal-clad switchgear (S1) applications if system is grounded (kpp=1.3)?	Clarify.	John Webb (ht. Ted Burse)	J. Webb and T Burse, Victor			
17	Technical	87	4.14	mention of high temp tests but not defintion/procedure	Check C37.016-2018, clause 7.11.5.3 for common clause	Andrew Chovanec	Henning Milnikel, Andrew Chovanec	in progress	cooperate with people of item #3, review wht is existing in C37.016, come up with common new text	
18	Technical			add references to C37.100.2	Refer Cap Sw tests to 100.2	Neil McCord	John Webb, Neil McCord, Roy Alexander	done		Recommended to update 09, for new revision move to 100.2
19	Technical			consider appropriateness of determining minimum clearing time	align .09 with -100 as related to min arcing time	Ted Burse	Ted Burse, John Webb, Harm Bannink, Terry Woodyard, Doug Edwards, Jan Weisker			
20	Technical			formulas for calculating assymetrical %DC for T100a 1ph need to be clarified	T100a 1ph needs to be clarifed as compared to TD 7 defintion in 1999 version	Sergio Flores	S. Flores, J. Webb, A. Chovanec	in progress		proposal from Andrew Chovanec

Item List - Amendment to C37.09

No	Category	Page	Sub-clause	Comment	Proposed Change	Proposer	To be prepared by	Status	Remark F22	Remark S23
23	Technical		4.5.2 i)		expand allowance to take advantage of symmetry during chopped wave test	Mauricio	Mauricio, J. Webb			
24	Technical		4.4.5		clarify accessible spots for temperature measurements	John Webb	John Webb, Henning Milnikel, Mike Crawford, Jake Walgenbach	in progress	not discussed in F22	tbd S23
26	Technical		4.8.2.9	4.8.2.9 is a poorly worded section, regarding unit tests and tests of a single pole of a three.phase circuit-breaker	The word "If" in a standard leads to disagreements. > The tests required to prove the concept are not listed. > Is one opening test required? > I have been asked to perform a three phase closing test based on this. It is not clear in this language why closing is needed. I will say that with tulip contacts in SF6 this is not necessary. > Should those tests have a real TRV. > Are these test three separate and independent currents? > Or is this three interrupters in series with one current and	Neil McCord	Neil McCord, Victor Savuliak	in progress		Proposal from Neil and Victor