Minutes of Meeting April 27, 2015

WG: C37.09 - IEEE Standard Test Procedure for AC High-Voltage Circuit Breakers Rated on a Symmetrical Current Basis (Under Revision)

Chair: Xi Zhu
Vice Chair: Victor Hermosillo
Secretary: Mike Skidmore

Session 1 – April 27, 2015 (10:15 AM to 12:00 PM)

Location: Saint Pete Beach, FL
Participants: 38 Members
41 Guests

1.) The meeting started with the chair introduction and introductions of the attendees. The chair asked all attendees to sign the roster and provide affiliation if not noted on the roster.

2.) The agenda for the meeting was shown on a projector and the chair reviewed the agenda for the meeting and the expected timeline. Refer to Doc. 084 for agenda presented.

3.) The chairman reviewed the minutes of the meeting (MOM) from Asheville. The MOM from Asheville was distributed to all committee members and guests of C37.09 on 10-07-2014 after the fall meeting with an e-mail from the secretary (Mike Skidmore). The draft MOM was also e-mailed by Mike Skidmore on 4-20-15, to all members and guests of C37.09. The meeting minutes are also posted on the IEEE PES Switchgear website. The minutes of the meeting from Asheville were shown again to the participants on the projector. The Chairman asked if anyone had questions.

4.) The chairman entertained a motion from John Webb to approve the MOM from Asheville. Roy Alexander seconded the motion. The motion passed unanimously.

5.) The chairman discussed the structure of the meetings for C37.09. He said 2 sessions will be held on 4-27-15.

6.) The Chairman discussed the project outlook:

1) First Ballot done by Fall 2015 or Spring 2016 Meeting
2) Recirculation No. 1 ~ 4 by Fall 2017
3) Submit to Revcom
4) Revcom decision
5) Completion by Dec. 2017

Xi plans to have the first ballot by Fall 2015 or Spring 2016. Depending how fast issues are resolved. The working group expects to have one to four re-circulations. By fall 2017, we hope to submit to RevCom.

No additional comments received from the Working Group (WG).

7.) The Chairman gave an overview of the project status. There were about 27 new topics to be added to the document. He received contributions to most of the topics. He updated the information from the 27 topics into several drafts until he achieved Draft 1.9 which was circulated for comments to members of PC37.09. Draft 1.9 was issued on 3-27-15 where he received more than 300 comments. He updated Draft 1.9 to version 2.0 and he re-issued it to the working group on 4-8-15. Before the meeting in Saint Pete, he integrated the majority of the comments into the document which was not issued yet to the working group members as Draft 2.1. The majority of comments were editorial. The chairperson has made determination regarding editorial comments. The meeting discussion will focus on a subset of comments. Draft 2.1 will be submitted to the WG after the spring meeting.

The Chairman reminded the working group there are a total of 84 documents in central desktop that are available to all members and guests. This includes all presentations and documents that will be integrated into the new standard. Chair can resend an invitation upon request.

Document 000 - Master documents with all topics, discussion during previous meetings, and WG document list.

Document 061 – History of draft revisions.

Document 079 – All comments received including disposition/resolutions at this point in time.

The chair presented table from Doc. 000 with a list of all topics with current status and references to document number of each topic.

8.) Chair asked if there are any other topics to be added to the agenda. No additional agenda topics were proposed.

9.) The working group membership and guest list was reviewed by the chair. The sign-up sheet is reviewed and contribution is considered. We propose to move individuals with no participation from membership to guest. John Webb and Ken Edwards said that a conference call can count as a meeting but you need two meetings / a conference call / or a face to face meeting to be reinstated. If you miss two meetings the individual is marked as a guest but if one attends two meetings and contributes to the project he/she is back on the membership list again.

The WG received several “undeliverable messages” when sending documents by e-mail. These individuals will be marked as a guest if currently marked as a member and they have not contributed to the document. The WG believes that several members are not active or have changed positions and are no longer involved with subcommittee work, etc… The chair reminded members and guests to update their information in the website. Also, some companies may limit file sizes they can receive and maybe this was part of the issue. In the end, the central desktop location is good to have where each and every document can be downloaded.

10.) The Chair moved to cover selected comments received to date

(Olsen 14) - Delete 62271-1 and use C37.100.1
John Webb said to keep this reference. Ted Olsen, defer the decision to the chair. Dave Stone said the C37.100.1 is being revised and should be done soon. There are new references of C37.100.1 and there is a lot compatibility with IEC. Anne Bosma said section numbers will change but IEEE and IEC will have common numbers for the clause/section. There was some discussion about the use of dated references. A date should be used in the reference if it refers to a specific clause within another document.

Conclusion: The WG to use C37.100.1 instead of IEC 62271-1 move to bibliography. Xi asked Denis Dufournet to check the references to -100.

(Olsen 15) - Delete 62271-100
Denis Dufournet said we should check to understand what the reference is for within the document. Ken Edwards said to move to bibliography. General comments were made to "Delete if no references are found within the document."

Conclusion: check all references to this document in text and then decide if necessary to move to bibliography.

(Olsen 78) - Delete IEC 62271-101

Mauricio Aristizabal: plan to replace 081 with 101. He said that there is a meeting on 4-28-15 to discuss this and a TF (Task Force) will look into references to -101.

(Olsen 80) - 4.8.1.4.2.2 Test duty T100a -Minimum clearing time

John Webb is satisfied with current contents. Perhaps Ted Olson will prepare a written statement and then discuss after meeting during conference call/exchange.
Ted Olson said there is confusion since a minimum can be on minor or major loop. He suggested opening for discussion perhaps after this meeting, may take too long to conclude regarding this topic.
Chair: There was a presentation by H. Heiermeier during C37.010 showing the relay time plus min opening time may not occur on major loop, then subsequent major loop is tested.
Determination of minimum arcing time
4.8.1.4.2.2 Line 26-33
Ted Olson: Too complex to understand conditions. Propose editorial review to simplify understanding.
John Webb: Tolerance on arcing windows. Test completed to IEC with slightly short window would not be accepted according to this procedure (10% tolerance).
Denis Dufournet: Which part should be revised? We should use the latest draft available at that time. Changes completed in the meantime have not been included yet. IEC is still a dynamic document. Second CD just issued and test T100a is as described now in C37.09.

Conclusion: Denis to send Xi the lasted draft "text" on T100a with the latest version from IEC. Denis to communicate with Ted to further explain this part of the standard. Wording may still

need to be modified to make it easier to read. Xi to send Ted the presentation Helmut made in C37.010 explaining various arcing times used in tests.

(Olsen 82) - 4.8.1.4.2.2 Comment to be rejected.

Ted Olson accepts to reject comment since new updates will be provided

(Olsen 84) - 4.8.1.4.2.2 Comment to be rejected.

Ted Olson accepts to reject comment since new updates will be provided

(Olsen 91) - 4.8.1.4.3.1 Redundant in document

The Chair explained that the information in this section is not redundant in document. One is for single phase testing and the other is for three phase testing, so it appeared to be duplicated.
Ted Olson accepts to reject comment.

(Olsen 144 and 145) - 4.8.4.2 Change to i2dt fix the language

Chair: Use RMS or effective value of current. Revise to reflect Simpson's rule.
Ted Olson: Use Simpson's rule to calculate.

Conclusion: Chair to review and revise to reflect Simpson's rule as needed.

(Olsen 157) - 4.9.2 Things that should be normative should not be in a note.

Ted Olson said this can easily be corrected. Instead of using "Note:" add the words "Note that if.."

Conclusion: The chair will review the document and correct accordingly.

(Olsen 162) - 4.10.1 Change terminology of indoor breakers to S1 and outdoor to S2.

Ted Olson: Need to decide if we use indoor/outdoor or S1/S2.
John Webb: We need to do it. C37.06 already has definitions. Indoor normally connected to cable. S2 breaker need short-line fault. May match well but it is not guaranteed. Check if all S1 requirements apply to indoor and S2 requirements apply to outdoor.
Anne Bosma: Line or cable connected. Outdoor/indoor is not synonymous with S1/S2.
Kirk Smith: C37.06 already has definitions and should be integrated into C37.04.

Defer to C37.06 and information needs to be coordinated with C37.07.

Conclusion: Accept in principal and make the change. Chair to change all "indoor/outdoor" to "S1/S2" within the document to match C37.06 and C37.04…

(Olsen 192) - 4.10.10 capacitive switching Table 7.

Comment: There is a long sentence in table.

Chair: t1, t3 well defined.
Ted Olson: Purpose is to include reference to C37.04 not to C37.06 which will disappear. The goal was to pull in C37.06 into C37.04.

Conclusion: Accept in principle, just change reference. Anne Bosma should review table because information does not align with other tables in C37.06. When checked the long sentence under "t1" in table refers to sections in C37.06 which are incorrect tables in latest standard.

(Olsen 214) - 4.14.2 f) What is "ta"?
Victor Hermosillo said that "ta" comes from mechanical endurance test which has not been added yet. It is a time period between subsequent operations that will not cause overheating, undue stress on motor changing or coils, other elements of controls.

Conclusion: Will include the definition of "ta". Need to change "ta" to other so it is not confused with arcing time. We must coordinate with C37.04.

(Olsen 217, 218, 220) - 4.17.1 Delete IEC 62155

Ted Olsen/Anne Bosma: Refer to C37.017 to avoid the conflict. If C37.017 changes and the information is imbedded within the document it is difficult to update C37.09.

Conclusion: refer to 017 and remove table

(Olsen 217, 218, 220) - 4.17.24. Table in C37.017.

Conclusion: same a previous - refer to 017 and remove table

(Olsen 225) - 4.20 RIV Test

Anne Bosma: CC1 is staying, SG4 is dissappearing.

Ted Olsen: Not relevant test today. Xi will modify his comment to replace with NEMA CC1 which is updated.

(Olsen 228, 240, 243, 245) - S1/S2 has already been discussed.

Conclusion: C37.09 should be updated to refer to "S1" / "S2" instead of "indoor" vs "outdoor"

(Dufournet 2) – 4.8.4.3 - Service Capability

4.8.4.3 First paragraph not correct anymore and needs to align with C37.04.

C37.04 service capability will change. Text in C37.06 will have to be changed to match with C37.04.

Conclusion: Keep consistency between both documents, update as necessary.

(Carmona 2) - 4.8.2.4.4 – Wording regarding choice of units to be tested.

Gil Carmona interpretation is that this suggests one to use only one test unit to perform all tests with retrofitting after tests. This may take too long. It is unclear on the number of test specimens allowed.

Conclusion: Gil Carmona to work with Victor Hermosillo to come up with correct wording to clarify the meaning of this section.

(Carmona 3) - 4.8.1.3 Regarding DC<20% to be considered a symmetrical current.

Denis Dufournet: in conflict with proposal T100a.

Clarification by GC: Seems to contradict proposal by D. Dufournet.

Conclusion: All power test laboratories and circuit breaker test reports consider DC<20% as a symmetrical current. Some measure the exact value, others indicate only DC<20%. It is currently universal common practice.

(Anne 3 and 4) - 4.1 and 4.2 – maximum voltage test and power frequency test

4.1 Maximum voltage test is not a test and should be removed from the document.

Chair: this value is embedded in TRV tests based on the maximum rated voltage.

Bosma / Alexander: remove this section.

Ken Edwards: Tests to confirm maximum rated voltage Where do you get rating?
Neil McCord: Had customer question requiring 252 kV instead of 245 kV. Cannot guarantee that it will interrupt the current at this voltage because it wasn't tested…
Kirk Smith: Should say, there is no separate test for rated maximum voltage because it is embedded in the other tests.
Pat DiLillo: Some utilities operate at the rated maximum voltage. This is a real issue and in some cases it is operated above maximum voltage for a brief period of time.

Conclusion: Xi Zhu to modify the wording and/or delete the first sentence. Remove "however"..

4.2 Power frequency test

Conclusion: Same revision as 4.1, reword and remove text.

(Anne 6) - 4.4.1 Test conditions

There is a loop in the standards. Section calls for IEEE Std. 4.
Ken Edwards: If we allow correction factors then we should be specific.
Anne Bosma: This standard is for circuit breakers and has to be specific about correction factors.
Ted Olson: Reference item n) of this same clause.
Gil Carmona: Specify dielectric withstand power frequency test.

Dave Stone: Refer to C37.100.1, common requirements has been updated. Any of the tests: dielectric, continuous current, short-time, peak withstand, RIV, maybe these sections can be removed and just refer to C37.100.1

Conclusion: We need volunteers to review the document and compare with 100.1 to see if sections can be removed. Remove e)," this is the apparatus standard." Add footnote on e) and n) with standards that allow correction factors (ask Ted Olson). C37.20.2 and 20.3
John Webb to take 4.4 dielectric.
Steve Cary: to take 4.3 continuous current.
Kirk Smith 4.18 sealed pressure systems
Anne Bosma 4.19 PD tests
Anne Bosma 4.20 RIV

Deadline by June 2015.

11.) The working group committee agreed to adjourn the session. Work will resume after lunch

Session 2 – April 27, 2015 (1:30 PM to 3:15 PM)

Location: Saint Pete Beach, FL
Participants: 42 members
37 guests

1.) The meeting started with the chair introduction and introductions of the attendees. The chair asked all attendees to sign the roster and provide affiliation if not noted on the roster.

2.) At the break working group reminded the chairman that short-time current and peak withstand current are now included in power tests in the table of contents. These may be separated out in the table of contents from power tests and then reference would be made to C37.100.1 for the associated tests.

3.) The chairman said they will continue with selected comments where the working group left off before lunch:

(Anne 9) - 4.4.3.1 Verification of peak as sqrt(2) of rms/effective value

May be solved by reference to IEEE Std. 4 and common clauses C37.100.1.

Pat DiLillo: Does not agree with moving everything referencing or going to another standard. You have numerous documents open to find a single answer and it is not convenient.
Gil Carmona: Which one is the master standard? He agrees that we do not want to refer back and forth.
Roy Alexander: Common clauses have the specific purpose of covering multiple products.

Chair: Need to read carefully each test description and procedure and assess if it satisfies all the requirements.

(Anne 12 and 13) - 4.8.1.4.2.1 Test to be done in sequence O-.3s-CO-3 min-CO

Three-phase tests T10, T20, T60, T100a/s, OP1/2.

Denis Dufournet: We only discuss the arcing time requirement, later we discuss sequence in Table 2.

Chair: Table 1 has arcing times, Table 2 test sequence.

Conclusion: Disregard this comment if it is covered in another table.

(Anne 14) - 4.8.1.6 Editorial comment regarding tables.

Place table in a location where it is cited first.

Conclusion: Switch Table 1 and Table 2 but this will be major work since the document needs to be rechecked (wording match the correct tables).

Equation 4, unit should be H vs HENRY.

Chair proposal: Remove units from formula.

Add another line that says LL in [H].

Denis Dufournet: amplitude constant d (peak factor) is not an amplitude constant (line 1511) in c).

Conclusion: The chair will review again to prevent confusion and make clear.

(Anne 15) - 4.9.2 Load current switching test conditions.

Anne Bosma: What is the significance of testing load current, it is not a common test?
Sushil Shinde: for HV switching of capacitive or inductive load, these are already contemplated.
John Webb: This is a new requirement in 3) 175-250%. What is the purpose? He believes modern technology not at risk.
Eldridge Byron: To cover performance of new devices. (3) 175-250% came from certain values of tests, some calibration shots fall in this range. He was trying to cover a complete range of possible current values.
Leslie Falkingham: These are switching tests, not continuous current overload.
Anne Bosma: If you had 200% of current just before switching this is similar to a fault test. In addition power factor is 80% lagging.
Gil Carmona: Can be overload condition. For how long?
Pat Di Lillo: There are some current ratings that are not covered and are below T10 level. Could there be a new technology that has issues with very low currents?
John Webb: Manufacturers will check additional current levels for new technology.
Eldridge Byron: This is a conditional test not a mandatory test.
Anne Bosma: This covers a critical current at the low range.

Kirk Smith: This range of tests may be correlated with overload currents in transformers. We could check how it compares. He believes this test was added or used to be an issue with air-magnetic breakers and is probably not an issue today. Do not know of any current technology that would have an issue.
Sushil Shinde: The last discussion was only in reference to medium voltage equipment.
Carl Schultz: For new technologies users want to know if there is a problem for the range of currents in 3).
Chair: Fault testing x/r=17, power factor is very small. In this case lightly inductive but mostly resistive, it does not present an interrupting challenge for the circuit breaker. TRV is small. Is it different for medium voltage breakers?
Stan Billings: Mostly medium voltage test.
John Webb: This is a conditional test.
Mauricio Aristizabal: There are no definitions of TRV.
Chair: It was added by Eldridge, added only for purposes of medium voltage. Add specific wording to indicate it is only applicable to MV.

Conclusion: Make clear the test is valid only up to 52 kV rated maximum voltage. Remove 3) (175 – 200%) range. Byron concurs. Also we need editorial change to note.

(Anne 16) - 4.9.3 Load current endurance switching test

Anne Bosma: Why would you require an endurance test under load current conditions? Propose to remove.
Pat DiLillo: I do not agree with removing it.
Roy Alexander: This was for air-magnetic issues.
Eldridge Byron: This is already in the standard's current version.
John Webb: Explain the reasoning for removing load current endurance in the introduction of the standards. Reason: this test is never performed because the endurance is demonstrated by……

Chair: You always satisfy the other requirement.

Conclusion: Delete 4.9.3 and add comment on the introduction to the standard why section 4.9.3 was removed.

(Anne 17) - 4.12 Line closing switching surge factor

Anne Bosma: This is not a test it is a simulation made for 362 kV and above. Users apply the breaker with closing resistors, surge arresters or controlled closing to address surge factor.

Gil Carmona: Proposal to place in Annex. It helps the user…. Others agreed…
Roy Alexander: Should be added to applications guide C37.010.
Helmut Heiermeier: We just removed this from C37.010.

Chair: Need to agree on placing back on C37.010 or to include in Annex.

Conclusion: This will be moved to the Annex in C37.09

(Anne 18) - 4.14.2 Low temperature operating tests

Anne Bosma: This is a poor copy of the IEC procedure for testing low temperature.

Victor Hermosillo: There are three main differences between the proposed procedure and IEC. The first is that there is only one soak period of 24 hours in the closed position, at the end of this period the breaker is opened. This is important to ensure that the breaker can interrupt and open the circuit. IEC has a second soak period of 24 hrs. in the open position, this is not included. Nevertheless, there are 50 subsequent operations with C, O and CO cycles. The second difference is that there is only an initial and final check on leakage, to assess the leakage from start to finish. IEC requires leakage rates at ambient, hot and cold with specified limits. If a dead-tank breaker with tank heaters is tested at cold temperature using an accumulation method, then there are practical limitations in obtaining a steady temperature inside the accumulation volume. The proposal includes start/end leak checks and an accumulation test could be performed at the end. The third variation is the two-hour loss of power without lockout. This would lead to over dimensioning of the tank heaters. In practice, due to wind, the lockout will be reached in a few minutes.

Conclusion: Victor Hermosillo to review and modify (update) with Anne Bosma, Sushil Shinde and Mauricio Aristizabal.

(Roy 4, 5) – 4.10.5 - Capacitive switching

General discussion on capacitive switching and this section needs more. He desires a "CO" operation and this is what the equipment will see in the field.

Conclusion: test lab should be able to accommodate for no drop in voltage. Roy to work with Xi to update sections accordingly

(Roy 4, 5) - 4.10.9.1.1.3 Alternative of separate making tests

Roy Alexander: No need to explain why it is being done. Delete the note or make it correct. There was influence of SF6 in the drafting stage. No need to talk about turbulence. CO tests should be done.

Conclusions: Take note away. Lines (2545 and 2720) to be deleted.

(Roy – 12) - 4.10.11.3 Criteria for class C0

With direct test additional restrikes can be verified. With a synthetic test we know that the first restrike happened since the voltage goes away during the test. There is no knowledge about subsequent restrikes. Direct tests this is not a problem.

Anne Bosma: Purpose is for distribution not for HV, which use synthetic tests.

Helmut: Arresters will be used….

Conclusion: Indicate that for C0 qualification direct test is required to confirm only one restrike for operation.

(Roy – 13) - 4.11 Inductive load switching

Roy Alexander: M2 mechanical endurance is not related to electrical endurance.

Conclusion: Proposal is to remove 2943 to 2949, third and fourth paragraphs. Chair agrees.

(Chow – 14) - IEC/IEEE 62271-37-082

No need to repeat references to ANSI S1.1., S1.4 and S1.13. They are already included in IEC/IEEE 62271-37-082 which is already mandatory.

Conclusion: We need to check if there are referenced in the body of the standard. Reference could be made to the dual logo standard. 4.21.1 and 4.21.2 of C37.09 includes references to these ANSI standards. Chow to help the chair review this issue.

4.) General recommendations:

Dave Stone made a comment about editing. We should try to remove hanging paragraphs. This is the text after the main heading, because it makes referencing difficult. A good example is the wording between 4.4 and 4.4.1. The wording should start with 4.4.1 and the entire section is 4.4. This was a suggestion made from other document he worked on with IEEE.

Conclusion: The chair said the document will be updated to remove hanging paragraphs.

5.) The working group committee agreed to adjourn the session.

				Saint Pete Beach FL Meeting Session 4/27/2015	
First Name	Last Name	Company	Role	#1	#2
Syed Shahab Uddin	Ahmed	Siemens Energy Inc	Guest		X
Roy	Alexander	RWA Engineering	Member	X	X
Mauricio	Aristizabal	ABB	Member	X	X
Aasim	Atiq	Siemens Energy	Guest	X	X
Roy	Ayers	Nashville Electric Service	Guest		
Katrin	Baeuml	Schneider Electric	Guest		
William	Bane	Nashville Electric Service	Guest		
Amildo	Barrio	Parsons	Guest		
Jerry	Baskin	Federal Pacific	Guest		
George	Becker	Electric Power Research Institute	Guest		
Jean-Marc	Biasse	Schneider Electric	Guest		X
Stan	Billings	Mitsubishi Electric PP	Member	X	X
Anne	Bosma	ABB AB	Member	X	X
Jeffrey	Brogdon	Georgia Transmission	Guest	X	X
Steven	Brown	Allen & Hoshall	Guest		
Arben	Bufi	Hitachi HVB, Inc.	Member	X	X
Eldridge	Byron	Schneider Electric	Member	X	X
Donald	Cantrelle	Georgia Power	Guest	X	X
Gilbert	Carmona	Southern California Edison	Member	X	X
Stephen	Cary	GE Energy Management	Member	X	X
Steven	Chen	Eaton Corporation	Member	X	X
Wayne	Cheng	B C Hydro	Member		
Vincent	Chiodo	HICO	Guest		
Jeonghwan	Cho	HICO America	Guest		
Chih	Chow	PEPCO	Member	X	X
Michael	Christian	ABB	Guest		X
Roggero	Ciofani	Altalink	Guest		
Lucas	Collette	Mitsubishi Electric	Member	X	X
Dave	Collette	Mitsubishi Electric	Guest	X	X
Lee	Cox, Jr.	Efacec	Guest		
Andrew	Crane	Consumers Energy	Guest		
Michael	Crawford	Mitsubishi Electric	Member		
Jason	Cunningham	Hitachi HVB, Inc.	Guest		X
David	Dart	NOJAPower	Guest		
Jerod	Day	Vacuum Interrupters, Inc.	Guest		
Patrick	Di Lillo	Consolidated Edison Co. of NY, Inc.	Member	X	X
Denis	Dufournet	Alstom Grid	Member	X	X

Bernie	Dwyer	PECO	Guest	X	X
John	Eastman	INCON	Guest	X	
Ken	Edwards	Bonneville Power Administration	Member	X	X
Doug	Edwards	Siemens Industry, Inc.	Guest		
Tanner	Esco	Eaton Corporation	Guest	X	
Leslie	Falkingham	Vacuum Interrupters Limited	Member	X	X
Thomas	Field	Engergy	Member		
Sergio	Flores	Schneider Electric Inc. USA	Guest	X	X
Robert	Foster	Megger	Guest	X	X
Paul	Fox	Schneider Electric	Guest		
Didier	Fulchiron	Schneider-Electric	Guest		
Sivakumar	Ganesh	ENMAX Corporation	Member		
Douglas	Giraud	Powell Electrical Systems	Member	X	X
Paul	Grein	Circuit Breaker Sales, Co, Inc, - GroupCBS	Member	X	X
John	Hall	Tennessee Valley Authority	Guest		
Jeffrey	Hanson	Schneider Electric	Guest		
Helmut	Heiermeier	ABB	Member	X	X
Charles	Hendrickson	Arizona Public Service Company	Guest		X
Jeremy	Hensberger	Mitsubishi Electric Power Products Inc.	Guest	X	X
Victor	Hermosillo	Alstom Grid	Vice-Chair	X	X
Jingxuan (Joanne)	Hu	RBJ Engineering Corporation	Member	X	X
Roy	Hutchins	Southern Company Services	Member	X	X
Todd	Irwin	Alstom Grid Inc	Member		X
Carlos	Isaac	Oncor Electric Delivery	Guest		
Anton	Janssen	Liander	Guest		
Jacob	Joseph	Toshiba International Corporation	Member		
Wolfgang	Jung	Siemens AG	Guest	X	
Mangu	Kang	HICO America	Guest		
Jayamali	Kasige	Crown Technical Systems	Guest	X	X
Sandeep	Kulkarni	CG	Guest		
Carl	Kurinko	ABB Inc.	Guest		
Stephen	Lambert	Shawnee Power Consulting, LLC	Guest		
Carl	LaPlace	GE Industrial Solutions	Guest		
Matthew	Lawrence	Doble Engineering	Guest		
David	Lemmerman	PECO/Exelon	Guest		
Werner	Lesse	Siemens AG	Guest		
Wangpei	Li	Eaton	Guest		
Qian	Li	Powertech Labs INC.	Guest	X	X
Hua Ying	Liu	Southern California Edison	Member	X	X
Li	Liu	Eaton	Member		
Albert	Livshitz	CE Power Solutions	Member	X	X
Bjorn	Lofgren	Siemens Energy	Member		

Russell	Long	Retired	Member	X	X
Antonio	Mannarino	PSE&G	Guest		
Vincent	Marshall	Southern Company Services	Guest	X	X
Gary	Martin	Entergy	Member		
Ricardo	Martinez	CFE-LAPEM	Member		
Peter	Marzec	S&C Electric Co.	Guest	X	X
Neil	McCord	Southern States	Guest	X	
Timothy	McGee	Siemens Energy	Guest	X	X
Dave	Mitchell	Dominion	Guest	X	X
Terry	Monahan	Schneider Electric	Guest		
Tom	Mulcahy	Dominion Virginia Power	Guest	X	X
Volney	Naranjo	Megger	Guest		
Jeffrey	Nelson	Tennessee Valley Authority	Member		
Joachim	Oemisch	Siemens AG	Guest		
Ted	Olsen	Siemens Industry, Inc.	Guest	X	
Miklos	Orosz	Schneider Electric	Member	X	X
Molson	Parvin	CB&I	Guest		
Amit	Patel	GE	Guest		X
Shawn	Patterson	US Bureau of Reclamation	Guest	X	
Thomas	Pellerito	DTE Energy	Member	X	X
Alan	Peterson	Utility Service Corporation	Guest		
Lise	Phan	Parcific Gas and Electric Company	Member		
Iulian	Profir	Rockwell Automation	Member	X	X
Syed	Rahman	The United Illuminating Company	Member		
Samala Santosh	Reddy	Powell Industries	Guest	X	X
Frank	Ricard	FirstPower Group LLC	Member		
Anthony	Ricciuti	Eaton Corporation	Member		
Dave	Riffe	Westinghouse Electric Company	Guest	X	
Julian	Rizo	Xcel Energy	Guest		X
Brian	Roberts	Southern States, LLC	Guest	X	X
Jon	Rogers	Siemens Energy, Inc	Member		X
Ben	Rosenkrans	Eaton Corporation	Guest		
Roderick	Sauls	Southern Company Services	Member	X	X
Victor	Savulyak	DNV GL KEMA Laboratory	Guest	X	
Robert	Sazanowicz	The United Illuminating Company	Guest	X	
Daniel	Schiffbauer	Toshiba International Corporation	Guest	X	X
Carl	Schneider	Schneider Electric	Guest		X
Carl	Schuetz	American Transmission Company (ATC)	Member	X	X
Jon	Schumann	American Transmission Company	Member	X	X
Devki	Sharma	Consultant	Member		X
Harish	Sharma	Southern Company	Guest	X	X
Sushil	Shinde	ABB Inc.	Member	X	X
John	Shullaw	GE Energy Management - Industrial Solutions	Guest	X	X

Dean	Sigmon	Eaton Corporation	Member		
Sunita	Singh	Bechtel OG&C	Guest		
Michael	Skidmore	AEP	Secretary	X	X
Robert	Smith	Eaton Corporation	Member	X	X
Hongbiao	Song	Bechtel	Guest		
Hongbiao	Song	GE	Guest	X	
Erin	Spiewak	IEEE	Guest	X	
Don	Steigerwalt	Duke Energy	Guest	X	X
David	Stone	DTS Technical Services	Guest	X	X
Donald	Swing	Powell Industries	Member		
Dragan	Tabakovic	Hitachi HVB	Guest	X	X
Humayun	Tariq	American Electric Power	Member	X	X
Jean-Marc	Torres	EATON	Guest	X	X
Vernon	Toups	Siemens	Member	X	X
Richard	Trussler	Schneider Electric	Guest		
James	van de Ligt	CANA High Voltage Ltd.	Member		X
Wes	Wadsworth	Hitachi HVB, Inc.	Member		
John	Webb	ABB	Member	X	
Casey	Weeks	Siemens Energy	Guest	X	X
Jan	Weisker	Siemens AG	Guest	X	X
Jerry	Wen	BC Hydro	Guest	X	X
Matthew	Williford	Schneider Electric	Guest	X	X
Terry	Woodyard	Siemens Industry Inc.	Member	X	X
Lisa	Yacone	IEEE-SA	Guest		
Dong Sun	Yoon	HICO America	Guest		
Richard	York	Consultant	Guest	X	
Jiong	Zhang	MEPPI	Member		X
Wei	Zhang	Hitachi HVB, Inc.	Guest	X	X
Xi	Zhu	GE Energy Management	Chair	X	X

“X” - individual was at the meeting in Saint Pete