

High Voltage Circuit Breaker WG Meeting Notes Pittsburgh – October 11, 2016 (8 - 12 AM)

IEEE C37.04 revision to include IEEE C37.04 a, C37.04 b, C37.06-1999 ratings, and NEMA SG-4

Chair: Stephen Cary Vice Chair: Roy Alexander Secretary: Mike Crawford

Meeting called to order 8:05a

- Introductions of group members were made and attendees have been provided below
- A call for review of Hilton Head minutes was made - no comments were filed
- It was noted the PAR expires 12/30/2017 and the plan is to complete on time
- The chair informed the WG group that the ballot pool had formed
- The ballot pool 200+ is equally split among users, consultants and manufacturers
- Ballot decision was considered, and John Webb moved and Bosma seconded to go to ballot
- Members present 28, Total members 45, Vote: Unanimous approval to Ballot
- MEC comments reviewed - Draft will be revised to correct draft
- Sushil Shinde agreed to assist in IEEE MEC corrections – specifically on requirement to embed fonts
- The WG agreed to add M1 and M2 definitions, by increasing requirements so standard is not less stringent. The definitions from IEC will be added and the mechanical endurance Table 23 will have Endurance requirements less than 2000 increased to M1. For IEEE circuit breakers having requirements of 5000 will have minimum requirement increased to M2. No WG members had objection adding M1 and M2, with these modifications.
- A short time current requirement of 100.1 was discussed. C37.04 agreed to deviate and keep short time current keep to C37.06 2009 requirement. Stone recommends updating reference to 2016 version of 100.1 as it should be <123kV 2s, >123 1s (C37.06-2009). C37.100.1 is pending copy write approval by IEC.
- CT wiring diagrams of NEMA and IEEE draft shown. It was agreed to keep CT Drawing format in draft detailed with high resolution .pdf as shown during meeting. IEEE editors to make final decision.
- 7.4.4.2c monitoring for capacitive stored energy. It was agreed to revise the draft to indicate readiness to operate rather than monitoring should be considered.
- 7.8.3 Condensation reduction. Indoor/Outdoor distinction discussed and agreed to revise. Wording proposed by Eldridge and will be revised accordingly by Cary and Eldridge.
- Flash plating – ranging from (0.000 001” to 0.000 003”) to (.000 003 to 0.000 006 “) specifications, was compared to electroplating which is typically 0.0002” was discussed. It was agreed to not increase the requirements of plating requirement to include a minimum thickness.
- Thermal limit table missing -- use as criteria for 100.1 and provide details in both C37.04 and C37.09. It was noted it has been traditionally been in .04 Webb and Eldridge to coordinate with Cary. IEC TR 60943 basis for 100.1 -2016 temp rise table, and technical reasons for higher temperatures shall be evaluated at next meeting.
- Based on Olsen comment, it was decided that PD not required for .04, and will remain only a requirement within the assembly (C37.20.2)
- It was decided that .017 would apply to GIS and CBs
- It was decided details of sub clause 5.2.3 would be removed from the draft which will go to ballot
- Major change list introduction. IEEE or WG has no requirement but it has been historically a “nice “ to have requirement. It was agreed that Carl Schuetz and Jim Van deLigt to develop list changes and make decision as to whether it will be added before going to ballot. Joe Jaskinski as of end of meeting was added to review.
- Symbols of springs and indicators to remain same “charged” and “discharged” as result of no consistent international symbols or common clause requirements.
- The issue of leakage and accuracy of gas installed was discussed. Specifically requiring kg of SF6 on nameplate with a defined precision? A certified 1% accuracy from factory test is desired and this could be an alternative

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to report details on the test report. C37.04 will coordinate with IEEE nameplate task force chair, and other interested parties (EPA). The objective is to encourage accurate reporting and low leakage options to reduce emission of SF6 gas.

- Nameplate entry Actual weight of SF6 +/-0.001p.u. (0.1%) is desired. Would this require mass flow meter measurement or is weighing the gas cylinder before and after filling sufficient. C37.04 Chair to work with SF6 Nameplate Task force on final requirement for draft.

• First Name	• Last Name	• Company	• City	• State/Country	• Attendance	• Member
William	Ackerman	Ackerman and Associates				
Syed Shahab Uddin	Ahmed	Siemens Energy Inc	Madison	MS		
Roy	Alexander	RWA Engineering	Cranberry Twp.	PA	1	1
Mauricio	Aristizabal	ABB	Pittsburgh	PA	1	1
Aasim	Atiq	Siemens Energy	Madison	MS	1	
Roy	Ayers	Nashville Electric Service	Nashville	TN		
Ganesh	Balasubramanian	Eaton Corporation	Horseheads	NY		
Robert	Barnett	Tennessee Valley Authority	Chattanooga	TN		
Thomas	Barnes	Barnes Consulting				
George	Bartok	RLC Engineering				
Robert	Beavers	Sargent & Lundy				
George	Becker	Electric Power Research Institute	Guilford	CT		
Robert	Behl	ABB			1	
W.J. (Bill)	Bergman	PowerNex Associates Inc.	Calgary	Canada		
William	Bloethe	Consultant				
Stan	Billings	Consultant	Murrysville	PA	1	1
Wallace	Binder	WBBinder Consultant				
Kofi	Boadi-Boateng	Pepco	Laurel	MD		
Mike	Boening	Plansee Powertech AG	Seon	Switzerland		
Antone	Bonner	Eaton	S. Milwaukee	WI		
Anne	Bosma	ABB AB	Ludvika	Sweden	1	1
Alessandro	Bottarelli	ABB	BERGAMO	Italy		
Cody	Brehm		Milwaukee	WI		
Jeffrey	Brogdon	Georgia Transmission	Suwanee	GA		
Steven	Brown	Allen & Hoshall	Bartlett	TN	1	1
Raymond	Browning	FirstEnergy Corp.	Copley	OH		
John	Brunke	Whidbey	Fuseland	WA		
Arben	Bufi	Hitachi HVB, Inc.	Suwanee	GA	1	1

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Ted	Burse	Powell Industries, Inc	Houston	TX	1	1
Eldridge	Byron	Schneider Electric	Smyrna	TN	1	1
Glenn	Calhoon	Westinghouse	Monaca	PA		
Thomas	Callsen	Weldy Lamont				
Donald	Cantrelle	Georgia Power	Forest Park	GA		
Paul	Cardinal	Shell				
Gilbert	Carmona	Southern California Edison	Pomona	CA		
Stephen	Cary	GE Energy Management	Mebane	NC	1	1
Steven	Chen	Eaton Corporation	Moon Township	PA	1	1
Vincent	Chiodo	HICO	Pittsburgh	PA	1	
Chih	Chow	PEPCO	Washington	DC	1	1
Michael	Christian	ABB	Lake Mary	FL		
Roggero	Ciofani	Altalink	Calgary	Canada		
Robert	Cohn	Power Con				
Lucas	Collette	Mitsubishi Electric	Warrendale	PA	1	1
Dave	Collette	Mitsubishi Electric	Warrendale	PA		
Jerry	Cox	Jackson EMC				
Michael	Crawford	Mitsubishi Electric	Cranberry Twp	PA		
Jason	Cunningham	Hitachi HVB, Inc.	Suwanee	GA	1	
Jerod	Day	Vacuum Interrupters, Inc.	Carrollton	TX		
Stephen	DeRoche	MTU				
Patrick	Di Lillo	Consolidated Edison Co. of NY, Inc. Lakeland Electric, City of Lakeland, FL	New York Lakeland	NY FL	1	1
Randall	Dotson	TDE				
Gary	Donner	Retired	Sathonay-Camp	France	1	1
Denis	Dufournet	PECO	Berwyn	PA		
Bernie	Dwyer	INCON	Saco	ME	1	
John	Eastman	Bonneville Power Administration	Vancouver	WA		
Ken	Edwards	Eaton Corporation	Greenwood	SC	1	
Tanner	Esco	Vacuum Interrupters Limited	Rugby	UK	1	1
Leslie	Falkingham	Eaton Electrical	Arden	NC		
Lawrence	Farr	Nashville Electric Service	Nashville	TN		
Howard	Fennel	Entergy	Jackson	MS		
Thomas	Field	Schneider Electric				
Sergio	Flores	Tetra Technologies	Sainte-Julie	Canada		
Marcel	Fortin	Powell Industries				
Paul	Forquer	Megger	Paradise	CA	1	
Robert	Foster	Schneider Electric	West Chester	OH		
Paul	Fox	NEMA				
Kenneth	Gettman	MEPPI				
Dave	Giegel	Powell Electrical Systems	Houston	TX	1	
Douglas	Giraud	Schneider Electric				
Mietek	Glinkowski					

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Anne	Good	Net Shape Technologies	Nashville	TX		
Edwin	Goodwin	Tip Goodwin Consulting, LLC				
James	Graham	Mott McDonald				
Louis	Grahor	Eaton				
Paul	Grein	Circuit Breaker Sales, Co, Inc, Group CBS	Gainesville	TX		
Boris	Kogan	Schneider Electric				
John	Hall	Tennessee Valley Authority	Chattanooga	TN		
John	Harley	FirstPower Group LLC				
Ronald	Hartzel	Eaton				
Christian	Heinrich	Siemens	Berlin	Germany	1	
Helmut	Heiermeier	ABB	Baden	Switzerland	1	1
Charles	Hendrickson	Arizona Public Service Co.	Phoenix	AZ		
Jeremy	Hensberger	Mitsubishi Electric		PA		
Victor	Hermosillo	Alstom Grid	Charleroi	PA	1	1
Bill	Higinbotham	EA Technology	Denville	NJ		
Werner	Hoelzl	AMS AG				
Jingxuan (Joanne)	Hu	RBJ Engineering Corporation	Winnipeg	Canada	1	
Bill	Hurst	Consultant				
Roy	Hutchins	Southern Company Services	Birmingham	AL	1	
Todd	Irwin	Alstom Grid Inc	Smithville	MO	1	
Carlos	Isaac	Oncor Electric Delivery	Fort Worth	TX		
Biasse	Jean-Marc	Schneider Electric	France	France	1	
Richard	Jackson	Detroit Edison	Detroit	MI		
Joseph	Jasinski	ITC Transco	Novi	MI	1	
David	Johnson	Consultant	Pittsburgh	PA		
Jacob	Joseph	Toshiba International Corporation	Houston	TX		
John	Kaminsky	Siemens Industry, Inc.				
Andy	Keels	Salt River Project	Phoenix	TX		
Chad	Kennedy	Schneider Electric				
Yuri	Khersonsky	Consultant				
Amir	Khosravi	BC Hydro	Vancouver	Canada		
James	Kinney	Consultant				
Jim	Kulchisky	CANA High Voltage Ltd.				
Sandeep	Kulkarni	CG	Mumbai	India		
Carl	Kurinko	ABB Inc.	N. Huntingdon	PA		
Stephen	Lambert	Shawnee Power Consulting	Williamsburg	VA		
Carl	LaPlace	GE	Raleigh	NC		
Matthew	Lawrence	Doble Engineering	Baldwinsville	NY		
Brad	Leccia	Eaton	Moon Township	PA	1	
Alex	Lee	HICO	LA	CA		
Paul	Leufkens	KEMA-Powertest	Chalfont	PA		
Hua Ying	Liu	Southern California Edison	Pomona	CA	1	1
Li	Liu	Eaton	Moon Township	PA		

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Albert	Livshitz	CE Power Solutions	Loveland	OH		
Bjorn	Lofgren	Siemens Energy	Richland	MS		
Russell	Long	Retired	Pittsburgh	PA		
Antonio	Mannarino	PSE&G	Springfield	NJ		
Vincent	Marshall	Southern Company Services	Forest Park	GA	1	
Gary	Martin	Entergy	New Orleans	LA	1	
Ricardo	Martinez	CFE	Irapuato	Mexico		
Peter	Marzec	S&C Electric Co.	Chicago	IL	1	
Joel	Mathewson	Siemens	Jackson	MS		
William	Mcbride	Consultant				
Neil	McCord	Southern States	Hampton	GA		
Timothy	McGee	Siemens Energy	Richland	MS		
Peter	Meyer	S&C Electric Company	Chicago	IL		
Dave	Mitchell	Dominion	Richmond	VA	1	1
Oscar	Montano	Salt River Project	Canada	Canada	1	
Georges	Montillet	GFM Consulting LLC	Canonsburg	PA		1
Charles	Morse	Siemens				
Tom	Mulcahy	Dominion Virginia Power	Richmond	VA	1	
Volney	Naranjo	Megger	Mansfield	TX		
Jeffrey	Nelson	Tennessee Valley Authority	Chattanooga	TN		
Michael	Newman	CSI Engineers				
Raj	Nayar	Siemens	Raleigh	NC		
Joel	Nims	Consultant				
Joachim	Oemisch	Siemens AG	Berlin	Germany		
T	Olsen	Siemens Industry, Inc.	Wendell	NC		
Lorraine	Padden	Padden Engineering				
Shawn	Patterson	US Bureau of Reclamation	Denver	CO		
Thomas	Pellerito	DTE Energy	Detroit	MI		
Andrew	Peterson	ABB	Lake Mary	FL	1	
Anthony	Picagli	Consultant				
Lise	Phan	Pacific Gas and Electric Company	Oakland	CA		
Zachary	Pintado	Entergy	New Orleans	LA		
Lulian	Profir	Rockwell				
Syed	Rahman	The United Illuminating Company	Orange	CT		
Farnoosh	Rahmatian	Nu Grid Power				
Frank	Ricard	FirstPower Group LLC	Twinsburg	OH		
Anthony	Ricciuti	Eaton Corporation	Moon Township	PA	1	1
Dave	Riffe	Westinghouse Electric Corporation	New Stanton	PA		
Brian	Roberts	Southern States, LLC	Hampton	GA		
Charles	Robers	Consumers Energy Company				
Jon	Rogers	Siemens Energy, Inc	richland	MS		
Tim	Rohrer	Exiscan				
Thomas	Rozeck	DTE Energy				

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Ryandi	Ryandi	Undetermined					
Steven	Sano	Consultant					
Roderick	Sauls	Southern Company Services	Birmingham	AL			
Victor	Savulyak	DNV GL KEMA Laboratory	Chalfont	PA	1		
Bartien	Sayogo	PLN Engineering					
Robert	Sazanowicz	The United Illuminating Co.	Wallingford	CT			
Daniel	Schiffbauer	Toshiba International Corp	Oliver	PA	1		
Carl	Schneider	Schneider Electric	Smyrna	TN			
Carl	Schuetz	American Transmission Co.	Waukesha	WI	1	1	
Jon	Schumann	American Transmission Co.	Waukesha	WI			
Devki	Sharma	Consultant	Byram	MS			
Harish	Sharma	Southern Company	Birmingham	AL			
Xu	She	GE Global Research					
Sushil	Shinde	ABB Inc.	Mt Pleasant	PA	1		
John	Shullaw	Retired -GE	Butlington	IA			
Dean	Sigmon	Eaton Corporation	Greenwood	SC	1		
Michael	Sigmon	Eaton	Greenwood	SC			
Sunita	Singh	Bechtel OG&C	Houston	TX			
Michael	Skidmore	AEP	Pickerington	OH	1	1	
Christopher	Slattery	FirstEnergy	Fairlawn	OH			
Jerry	Smith	Power Engineering Services					
Jeremy	Smith	GE					
Robert	Smith	Eaton Corporation	Horseheads	NY			1
H.	Smith	Juno	Salem	VA			
Erin	Spiewak	IEEE	Piscataway	NJ			
Don	Steigerwalt	Duke Energy	Charlotte	NC			
Ralph	Stell	SEPTA					
David	Stone	DTS Technical Services	Reading	MA	1		
Donald	Swing	Powell Industries	Houston	TX			
Ahmad	Qasem	Bechtel	Houston	TX			
Humayun	Tariq	American Electric Power	Gahanna	OH			
Henk	te Paske	KEMA Netherlands	Arnhem	Netherlands			
David	Tepen	Consultant					
Melcolm	Thaden	Consultant					
Michael	Titus	Schneider Electric	West Chester	OH			
Jean-Marc	Torres	EATON	horseheads	NY			
Vernon	Toups	Siemens	Richland	MS	1	1	
Marcelo	Valdes	GE					
James	van de Ligt	CANA High Voltage Ltd.	Calgary	Canada	1	1	
Michael	Wactor	Powell					
John	Wang	Consultant					
John	Webb	ABB	Florence	SC	1	1	
Casey	Weeks	Siemens Energy	Richland	MS			

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Jan	Weisker	Siemens AG	Berlin	Germany		
Jerry	Wen	BC Hydro	Burnaby	Canada	1	
Kenneth	White	Oglethorpe Power Corporation				
Matt	Williford	Schneider Electric	Smyrna	TN		
Terry	Woodyard	Siemens				
Robert	Yanniello	Eaton				
Dong Sun	Yoon	HICO America	Greensburg	PA		
Larry	Yonce	Eaton				
Richard	York	Mitsubishi Electric	Atlanta	GA	1	
Jian	Yu	Gannett Fleming				
Matthew	Zeedyk	Powell Industries				
Lukas	Zehnder	ABB Switzerland	Baden	Switzerland		
Jiong	Zhang	MEPPI	West Covina	CA		
Wei	Zhang	Hitachi HVB, Inc.	Suwanee	GA		
Xi	Zhu	GE Energy Management	Atlanta	GA	1	1
Jeff	Door	H-J Family of Companies			1	
Anton	Poeltl	ABB			1	
Alexander Hoover		Siemens			1	
Samala	Reddy	Powell			1	
Ian	Rokser	Eaton			1	
Dave	Feldmann	HICO			1	
Doug	Grandt	Eaton			1	
Brad	Leccia	Eaton			1	
Richard	Frye	Eaton			1	
Tyler	Holp	Eaton			1	
Joe	Kausek	First Energy			1	
Anthony	Ricci	First Energy			1	
Scott	Lanning	S&C Electric	Chicago	IL	1	
				Total	67	28