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**REPORT of  
SC17A MT47/IEEE WG C37.60 for the Revision of IEC 62271-  
111/IEEE C37.60-2003, Automatic Circuit Recloser Standard  
(Myrtle Beach, South Carolina, USA; April 27, 2010)**

The Working Group for the revision of C37.60-2003 held its 11th meeting on April 27, 2010 in Myrtle Beach, SC, USA between 8:00 AM and 6:00 PM.

The agenda was reviewed followed by introductions. The Chair welcomed Dr. Leslie Falkingham (UK) and Mr. Christian Heinrich (Germany) as members of the IEC MT and Dr. Christian Sasse as a new member of the IEEE WG. Also welcomed were guests M. Ceglia, J. Haasz and L. Yacone, all IEEE Staff members. Attendance included 20 members of the Dual Logo Maintenance Team and 13 guests. Ten members of the DLMT were absent or excused. Refer to Annex A for attendance list.

The Chair displayed and reviewed the IEEE patent policy and guidelines for the conduct of meetings (inappropriate topics of discussion).

### **Dual Logo Maintenance Team (DLMT) Timeline**

Chairman Stone outlined the timeline for pending goals for the WG/MT activities.

- The IEC CDV ballot has been approved by the IEC Central Office. It will be launched as soon as the decisions of the Myrtle Beach meeting are included in the draft. Target date is June 1, 2010. The ballot period for a CDV in IEC is five months, so closing will not occur before the next IEEE Switchgear meeting in September nor will it close before the IEC 17A plenary meeting in October (Seattle, OR, USA).
- Concurrent with the IEC CDV ballot, a third ballot within IEEE will be held.
- A special meeting of the DLMT may be required in December or January to review the comments from IEEE and IEC.
- The IEC FDIS (two month ballot period) and final IEEE ballot will be in 2011.
- The earliest publication date (assuming approval) will be late 2011.

### **Documents available on IEEE web site**

All documents from the WG are posted on the IEEE web site. The Chairman updates the list as required. Last update was on April 18, 2010. The Web address, ID and password have been given to all Working Group members. Contact the Chair if you need help.

### **WG/MT47 Membership**

Mr. Christian Sasse, Tavrida Electirc, North America has joined the IEEE Working Group.

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## Results of the circulation of 17A/899/Q

The questionnaire to IEC National Committees that was discussed at the Berlin meeting was presented along with the result as given in 17A/917/RQ.

There are 26 “P” member counties:

Number of NCs responding : .....14

Number of NCs in favour of permitting  
dependent manual operation: .....4 (AU, CN, CZ, RU)

Number of NCs against permitting  
dependent manual operation: .....6 (DE, ES, FR, GB, IT, NL)

Number of NCs abstaining: .....4 (IN, JP, PT, US)

The nine comments submitted with responses were reviewed.

## Discussion of Open Comments

The open comments have been reduced to ten topics that follow, with the question of dependent manual operation as discussed at the Berlin meeting being the most urgent.

### 1. Dependent manual operation:

- a. Issue must be addressed before we can go to CDV
- b. Proposal to introduce concept of a Type 1 and Type 2 Automatic Circuit recloser:
  - i. Type 1 would not permit dependent manual operation for fault closing or switching.
  - ii. Type 2 would permit dependent manual operation for fault closing and load switching.
  - iii. DLMT agree that concept was workable
- c. Following considerable discussion on the question of whether or not dependent manual operation (specifically when closing into a potential fault) should be allowed, several motions were made and voted upon. The final motion that was passed is as follows:

*Motion – That the recloser standard be revised to specifically prohibit dependent manual fault closing operations. In the case where there is no fault making rating assigned, all faults must be removed from the protected line before closing the device.*

- d. Details of the motions made and the voting results are given in Annex B
- e. **Action Item:** C. Lettow, L. Falkingham, C. Befus and C. Sasse volunteered to develop the specific language for the standard to implement the intent of this motion.

*Chairman’s note: in view of the final decision regarding dependent manual operation, the Type 1 and Type 2 designations may not be necessary.*

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2. **Operating sequence.**

- a. The cutout mounted reclosers as presently introduced by one manufacturer is only capable of an O-CO. This is different from the capability of all reclosers manufactured heretofore where a sequence has been: O- CO - CO - CO.
- b. Clause 4.105 has been added to the draft to address this issue but the wording is too limiting.
- c. Proposal was made to require that the operating duty and times be placed on the nameplate to signify the maximum capability and minimum test requirement. Customer can still select desired sequence for his application.
  - i. The preferred operating sequence for reclosers would be:  
O - t - CO - t' - CO - t'' - CO with  $t = 0.5$  s,  $t' = 2$  s, and  $t'' = 5$  s
  - ii. The preferred operating sequence for fault interrupters would be: O - t - CO
  - iii. Other sequences may be used
  - iv. The nameplate shall list the operating sequence if it is different from the preferred.
- d. Decision by vote on item (iv): Yes -16; No - 3 and Abstain - 2:
- e. Decision by vote on items (i, ii, iii) Yes by clear majority:

3. **Duration of the short-circuit momentary current  $t_k$ :**

- a. Preferred value is listed as 0.5 seconds in draft standard. Some IEC NC's says that is too short. It has never been in the standard before but was added in view of control capabilities to place recloser in a "switch mode" whereby it does not trip on an overcurrent.
- b. **Decision:** Retain 0.5 s as the preferred value and require that the rating be on the nameplate if different from the preferred.

4. **Ice coating and ice testing**

- a. Agreed to adopt IEC procedure taken from IEC 62261-102 which are very close to those of the IEEE switch standard.
- b. No testing required for ice coating rating that does not exceed 1 mm.
- c. Preferred ratings are 1 mm, 10 mm and 20 mm.
- d. **Action Item:** Chairman Stone will prepare revised clause 6.110 and distribute to WG for comment before finalizing CDV.

5. **Critical Current Test**

- a. Test for critical current will replace mainly active load switching tests.
- b. Procedure from IEC circuit breaker standard will be adapted for the recloser test duties.
- c. Representative from KEMA stated that the requirements for circuit breakers no longer exist; for the last 10 to 15 years they have not seen a critical current requirement. Vacuum technology does not have this problem.
- d. **Action Item:** Chairman Stone will distribute to test specifications to the WG for review before finalizing the CDV.

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6. **36 kV versus 38 kV.**
  - a. IEEE is 38 kV, IEC is 36 kV. Kirkland Smith suggests standardizing on the 150 kV number for both 36 kV and 38 kV recloser.
  - b. **Action Item:** Kirkland will edit the table and provide technical support for the changes.
7. **Line and cable charging**
  - a. A. Bonner will provide revision to clarify intent that both line and cable charging current tests are required on both single and three-phase reclosers.
  - b. Figure for test circuit will be modified to include a single-phase circuit.
8. **X/R values for standard operating duty test.**
  - a. The standard specifies minimum values for X/R. Some labs cannot attain the low X/R values at T20. A plus 100% tolerance may not be enough.
  - b. Suggestion to add a tolerance into the Annex E Tolerance for test values; WG did not feel this was necessary.
  - c. Delayed opening can be used until the current is at the correct asymmetry.
  - d. **Action Item:** KEMA will review and advise.
9. **DC withstand test duration**
  - a. C37.60-2003 reduced the duration from 15 minutes to 5 minutes. IEC and UK standards retain the 15 minute duration thus causing a harmonization issue.
  - b. It was pointed out that IEEE 404 is excluding dc test from cable joints and cable testing standards do not allow dc testing after 5 years of installation.
  - c. **Decision:** C37.60 will be revised to return it the 15 minutes duration to harmonize with IEC.
10. **TRV tables application to short circuit rating**
  - a. Question relates to IEEE comment in last voting. Recommended applying circuit breaker line values to ratings above 12.5 kA and use cable connected values for all ratings  $\leq 12.5$  kA. See Table 5 in draft.
  - b. Referenced TRV values in IEC 60282-2 for Class A and Class B fuses.
  - c. 12.5 kA is lowest preferred circuit breaker rating in IEEE C37.04 and is a popular/common rating for reclosers.
  - d. **Action Item:** K. Smith and A. Bonner will review and make recommendation to the WG.

In addition to the above discussion, three items were presented to the Working Group.

A. Partial Discharge Data:

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N. Uzelac is leading a task team to gather routine test data on partial discharge from several manufacturers. The data will be sent to KEMA for an independent analysis and summary that keep the manufacturers anonymous. The results of this effort should be available at the next meeting in September 2010.

**B. New functions provided by electronic controls:**

This is a forward looking issue to be considered by the WG for future action. Newer recloser controls provide functions that the standard does not address. Examples:

- Single-phase tripping with three-phase lockout
- Definition of minimum tripping current when phase ground and sensitive ground fault tripping choices can be made.

**C. Standard operating duty as specified versus test laboratory capability:**

This is another forward looking issue to be considered by the WG for future action. As recloser ratings have increased over the years, test laboratories are not able to meet the rigorous test duty requirements specified by the standard. In particular, test lab generator sets cannot hold the test voltage and current through a four operation sequence. TRV values are another issue. One suggestion is to limit the interrupting current rating of a recloser to some value such 16 kA. Should the WG consider alternative test procedures to demonstrate the capability?

The meeting adjourned at 6:00 PM.

David T. Stone  
Working Group Chairperson, C37.60 and  
Convenor for IEC MT47  
Reclosers and Other Distribution Switchgear Subcommittee  
May 5, 2010

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**Annex A: Attendance**

**IEC MT47/IEEE C37.60 Working Group Meeting April 27, 2010**

X = present at meeting

Role	First Name	Last Name	Company	Country	4/27/2010
Co-Chair	Robert	Behl	ABB	USA	X
Chair	David	Stone	DTS Technical Services	USA	X
Member, Corres	Michael	Ennis	S&C Electric Company	USA	Excused
Member, Corres	Marcel	Fortin	Hydro-Quebec Distribution	Canada	Excused
Member	Chris	Ambrose	Florida Power & Light Company	USA	Excused
Member	Herman	Bannink	KEMA Netherlands	Netherlands	Excused
Member	Craig	Befus	BC Hydro	Canada	X
Member	Antone	Bonner	Cooper Power Systems	USA	X
Member	Glenn	Borchardt	S&C Electric	USA	Absent
Member	Raymond	Capra	Consultant	USA	Absent
Member	Frank	DeCesaro	Cooper Power Systems	USA	X
Member	Randall	Dotson	Lakeland Electric, City of Lakeland, FL	USA	Excused
Member	Leslie	Falkingham	Vacuum Interrupters Limited	UK	X
Member	Lawrence	Farr	Eaton Electrical	USA	X
Member	Jeffrey	Gieger	Thomas & Betts	USA	X
Member	Peter	Glaesman	Reuel, Inc.	USA	X
Member	Christian	Heinrich	Siemens	Germany	X
Member	Harold	Hirz	Thomas and Betts	USA	Absent
Member	Edward	Jankowich	Thomas & Betts	USA	X
Member	Chris	Lettow	S&C Electric Company	USA	X
Member	Steven	Meiners	GE	USA	X
Member	Donald	Parker	Alabama Power Company	USA	X
Member	Timothy	Royster	Dominion Virginia Power	USA	X
Member	Christian	Sasse	Tavrida Electric North America Inc	Canada	X
Member	Robert	Smith	Eaton Corporation	USA	X
Member	Francois	Soulard	Hydro-Quebec	Canada	X
Member	James	Swank	Cooper Power Systems	USA	Excused
Member	Tim	Taylor	Thomas & Betts	USA	X
Member	Nenad	Uzelac	G&W Electric	USA	X
Member	Walt	Von Miller	Delta Technology Consulting, Inc.	USA	Absent
Member	Jan	Zawadzki	Powertech	Canada	Excused
Guest	Matthew	Ceglia	IEEE	USA	X
Guest	Samuel	Chang	Pacific Gas & Electric Co	USA	X
Guest	Larry	Davis	Reuel Inc	USA	X
Guest	Edgar	Dullni	ABB	Germany	X
Guest	Dan	Gardner	Thomas & Betts - Hi-Tech	USA	X
Guest	Jodi	Haasz	IEEE	USA	X
Guest	Michael	LaBianco	G&W Electric Company	USA	X
Guest	Daniel	Landreman	Cooper Power Systems	USA	X
Guest	Donald	Martin	G&W Electric Co.	USA	X
Guest	Sachin	Puranik	Hubbell Power Systems	USA	X
Guest	Larry	Putman	Powell Electrical Systems Inc.	USA	X
Guest	Jon	Spencer	Thomas & Betts Hi-Tech	USA	X

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Guest	Henk	te Paske	KEMA Netherlands	Netherlands	X
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**Annex B:**

**Details of motions and voting on subject of dependent manual operation**

**ORIGINAL MOTION:**

*That the recloser standard be revised to specifically prohibit dependent manual closing operation to energize a line.*

Motion – LFalk; 2<sup>nd</sup> – LFarr

**DISCUSSION:**

Motions were made to amend the original motion. Finally, the original motion was replaced by the following:

**MOTON MODIFIED AS FOLLOWS:**

*That the recloser standard be revised to specifically prohibit dependent manual fault closing operation. All faults must be removed from the protected line before closing the device. In this case there is no manual fault making rating assigned.*

Motion by LaF; 2<sup>nd</sup> by LeF

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**ROLL CALL VOTE #1**

	For	Against	Abstain
CB	1		
BB			1
AB		1	
FD		1	
LeF	1		
LaF		1	
JG		1	
PG		1	
CH		1	
EJ		1	
CL	1		
SM		1	
DP	1		
TR	1		
KS		1	
FS	1		
DS			
TT	1		
NU	1		
CS		1	

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**Motion Failed**

**New Motion:**

*Motion – That the recloser standard be revised to specifically prohibit dependent manual fault closing operations. In the case where there is no fault making rating assigned, all faults must be removed from the protected line before closing the device.*

Motion by: LeF; 2<sup>nd</sup> by CH

**ROLL CALL VOTE #2**

	For	Against	Abstain
CB	1		
BB	1		
AB		1	
FD	1		
LeF	1		
LaF			1
JG		1	
PG	1		
CH	1		
EJ		1	
CL		1	
SM	1		
DP	1		
TR		1	
KS		1	
FS	1		
DS			
TT		1	
NU	1		
CS	1		
	11	7	1

**Motion Passed**