REPORT of
SC17A MT47/IEEE WG C37.60 for the Revision of IEC 62271-111/IEEE C37.60-2003, Automatic Circuit Recloser Standard

(Asheville, North Carolina, USA; May 5, 2009)

Amended May 14, 2009

The Working Group for the revision of C37.60-2003 held its eighth meeting on May 5, 2009 in Asheville North Carolina, USA between 8:00 AM and 4:45 PM.

The agenda was reviewed followed by introductions. The Chair welcomed Dr. Leslie Falkingham (UK) and Mr. Harm Bannink (Netherlands) as members of the IEC MT and Ms Jodi Haasz and Matt Ceglia from IEEE-SA Staff. Attendance included 23 members of the Dual Logo Maintenance Team and 9 guests. Nine 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).

Note: The PowerPoint presentation used during the meeting will be placed on the WG/MT web site for access by members.

Dual Logo Maintenance Team (DLMT) Timeline

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

- A second Committee Draft (CD2) was to have been circulated by February to the IEC National Committees for comment between. However that circulation will be delayed until June at which time a second IEEE ballot will occur in parallel. See later discussion
- The IEC CDV ballot is due by June 2010
- The IEC FDIS and final IEEE ballot will be in 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 12, 2009. The Web address, ID and password have been given to all Working Group members.

WG/MT47 Membership

There have been no changes to the membership of the Working Group and Maintenance Team.

Status of Comments prior to Asheville meeting

The open comments have been reduced to 7 or 8 topics, the cutout recloser topic accounting for the vast majority.

Organization	Resolved	Open
IEC	73	3
IEEE	531	75
Totals	604	78

Report of the IEC 17A Plenary Meeting - Berlin, December 2008.

Chairman Stone gave a report on the meeting in Berlin noting that most of the IEC comments were resolved including several where the WG did not accept a comment. The comments that were referred back to the WG were noted. See Discussion of Open Issues below. The complete presentation presented at the Berlin meeting together with the conclusions is available on the WG web site under file name: "17A_MT47_Stone22_IEC_62271-111_BerlinPresentation_081227.ppt."

Significant Changes to the WG Draft

The latest Working Group draft was circulated to the WG before the meeting and is available on the WG web site under file: "17A_MT47_Stone25_PC37.60D05.3_090410.pdf." Attachment B lists the significant changes made to the draft following the Calgary meeting. Each item was reviewed briefly with little discussion.

Review of Comments

The open topics as shown in Attachment C were then discussed in some detail. The results of the WG discussions are summarized below:

1. Degrees of protection (Clause 5.13): The enclosure coating requirements of IEEE C57.12.28 should be normative for North American use and not relegated to an informative note. Some accommodation for other countries not wishing to use IEEE standard will have to be made.

2. Wet Tests (Clause 6.2.2): It was agreed that the solution of using one method for IEEE ratings and another for IEC rating was awkward but workable and acceptable. However, manufacturers of IEEE rated equipment will be urged to evaluate their designs to see if the IEC method of testing can be used exclusively in the future.

3. Cable and Line Charging tests (Clause 6.101): The proposed changes were discussed and accepted. A figure for the recommended test circuit will be added. Note: some changes to the proposal have been made since draft 5.3 was distributed.

4. Short line fault testing (new req't): The WG agrees that this test should not become a new required test in the absence of a good technical argument for it or adverse field experience. Reclosers are applied on distribution circuits which generally have distributed loads along their length that would mitigate the effects of short line fault transients. The WG will review this further before the next CD draft is released.

5. 50 Hz vs. 60 Hz qualification: An analysis by a WG member suggests that tests at T100 should be performed at both 50 Hz and 60 Hz in order to qualify for application at both frequencies. The WG feels that, in the absence of any adverse field experience, there is not sufficient justification for additional design testing.

6. TRV (Clause 6.103): TRV parameters for line and cable applications with interrupting ratings >4000 A have been harmonized with the circuit breaker standards IEEE C37.06 and IEC 62271-100.

7. Test topology for 2nd and 3rd phases to clear on effectively grounded circuits (Clause 6.103): This issue was raised by the Canadian NC. The WG will review the matter further before the next CD is released. While the circuit breaker standard does not require special tests for effectively grounded circuits at rated voltages below 100 kV, it was felt that the conditions are common enough in distribution circuits in the US and Canada to consider a modification to the standard operating duty test program.

8. Cutout Type devices (Annex L): For this discussion, Chairman Stone recused himself and asked Steve Meiners, Chairman of the RODE Sub-Committee, to lead the discussion. IEEE Staff members Matt Ceglia and Jodi Haasz assisted. There was a lengthy discussion on the subject centered around the question of changing the standard to accommodate the cutout type device. The points of discussion are summarized in Annex D. There followed a series of motions voted upon by the members of the WG present. The outcome of the voting was to add the cutout type interrupter to the standard, to meld it into the main document rather than as an annex and to change the title of the standard. It was also agree to leave the scope of the standard unchanged but to clearly delineate the differences in specifications of the three types of devices in the standard, namely the [traditional] recloser, the cutout type recloser and the fault interrupter. A PAR request will be made to IEEE to request the change in title:

Original title: *Standard for Overhead, Padmounted, Dry Vault, and Submersible Automatic Circuit Reclosers and Fault Interrupters for Alternating Current Systems Up to 38 kV*

Proposed new title: *Standard for Automatic Circuit Reclosers and Fault Interrupters for Alternating Current Systems Up to 38 kV*

Details of the motions:

1. Motion to follow a proposed "motion tree" consisting of the next four motions (#'s 2-5) listed below: Motion passed
2. Motion to include the cutout type recloser in C37.60.
   Motion passed: 13 in favor; 8 opposed; 0 abstain
3. Motion to cover the cutout type recloser in the main body of C37.60 rather than in an annex.
   Motion passed: 13 move to main body; 8 keep in annex. 0 abstain
4. Motion to change the title of C37.60.
   Motion passed: 14 in favor; number opposed or abstained not recorded

5. If motion #2 DID NOT pass: Motion to petition RODE Subcommittee to initiate a WG to develop a new standard to cover the cutout type interrupter device.

Motion withdrawn since #1 passed

6. Motion to change the title of C37.60: From (present title)

Standard for Overhead, Padmounted, Dry Vault, and Submersible Automatic Circuit Reclosers and Fault Interrupters for Alternating Current Systems Up to 38 kV

To (proposed new title):

Standard for Automatic Circuit Reclosers and Fault Interrupters for Alternating Current Systems Up to 38 kV.

Motion passed: 18 in favor; 2 opposed; 0 abstain

7. Motion to retain the original Scope of C37.60 without change and handle the special case of the cutout recloser in the body of the document.

Motion passed: 14 in favor; 6 opposed; 1 abstain

8. Motion to add specific information in the body of the text to provide a clear distinction among the three types of devices ([traditional] reclosers, cutout type reclosers, and fault interrupters) and not rely on a simple definition in the definitions clause 3.0.

Motion passed: 18 in favor; 1 against; 2 abstain

The meeting adjourned at 4:45 PM.

David T. Stone
Working Group Chairperson, C37.60 and
Convenor for IEC MT47
Reclosers and Other Distribution Switchgear Subcommittee
May 12, 2009/Amended May 14, 2009

Annex A: Attendance

IEC MT47/IEEE C37.60 Working Group Meeting May 5, 2009

X = present at meeting

Role	First Name	Last Name	Company	Country	5/5/2009
Co-Chair	Robert	Behl	ABB	USA	X
Chair	David	Stone	DTS Technical Services	USA	X
Member	Chris	Ambrose	Florida Power & Light Company	USA	X
Member	Herman	Bannink	KEMA Netherlands	Netherlands	X
Member	Jerry	Baskin	Federal Pacific	USA	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	X
Member	Larry	Davis	Reuel Inc	USA	absent
Member	Frank	DeCesaro	Cooper Power Systems	USA	X
Member	Randall	Dotson	Lakeland Electric, City of Lakeland, FL	USA	X
Member	Michael	Ennis	S&C Electric Company	USA	X
Member	Leslie	Falkingham	Vacuum Interrupters Limited	UK	X
Member	Lawrence	Farr	Eaton Electrical	USA	X
Member	Marcel	Fortin	Hydro-Quebec Distribution	Canada	excused
Member	Jeffrey	Gieger	Thomas & Betts	USA	excused
Member	Peter	Glaesman	Reuel, Inc.	USA	X
Member	Christian	Heinrich	Siemens	Germany	excused
Member	Harold	Hirz	Thomas and Betts	USA	X
Member	Edward	Jankowich	Thomas & Betts	USA	X
Member	Steven	Meiners	GE	China	X
Member	Donald	Parker	Alabama Power Company	USA	X
Member	Timothy	Royster	Dominion Virginia Power	USA	X
Member	Robert	Smith	Eaton Corporation	USA	X
Member	David	Smith	AZZ/Calvert	USA	absent
Member	Francois	Soulard	Hydro-Quebec	Canada	excused
Member	James	Swank	Cooper Power Systems	USA	X
Member	Nenad	Uzelac	G&W Electric	USA	X
Member	Walt	Von Miller	Delta Technology Consulting, Inc.	USA	X
Member	Jan	Zawadzki	Powertech	Canada	X
Member	Anthony	Headley		UK	excused
Member	Zhengli	Kou		China	absent
Guest	Matt	Ceglia	IEEE	USA	X
Guest	Edgar	Dullni	ABB	Germany	X
Guest	Mark	Feltis	Schweitzer Engineering Laboratories	USA	X
Guest	Jodi	Haasz	IEEE	USA	X
Guest	Michael	LaBianco	G&W Electric Company	USA	X
Guest	Chris	Lettow	S&C Electric Company	USA	X
Guest	Donald	Martin	G&W Electric Co.	USA	X
Guest	Karl	Pilz	Siemens Energy Inc.	USA	X
Guest	Larry	Putman	Powell Electrical Systems Inc.	USA	X
Guest	Gerard	Schoonenberg	Eaton	Netherlands	X

Annex B:
Significant Changes Discussed at Last Meeting

Clause	Subject	Question or Comment
3	Definitions	➢ Several new definitions added
3.20	Unit operation	➢ Definition expanded
4.4 and Table 3	Temperature rise	➢ Entire table brought it with new note #2 to point areas not harmonized with C37.100.1 and IEC 62271-1
4.10	Compressed gas systems	➢ Added applicability of but referred to manufacturer.
4.101	Rated minimum tripping current	➢ Removed 2X rated normal current as preferred, retained 10% tolerance, referred to manufacturer
5.1	Liquid level and quality	➢ Deferred to C37.100.1 and IEC 62271-1 for requirements
5.3	Grounding provisions	➢ Added peak current requirement to withstand requirements.
6.2.6.2	Lightning impulse withstand test voltage	➢ Retained the +3%/-0 tolerance whereas IEC uses +/- 3%
6.3	Radio Influence Voltage Tests	➢ No longer a requirement of this standard
6.5.5	Temp rise testing of aux. and control equipment	➢ Added exemptions to this test as a requirement.
6.8	Tightness tests	➢ Added requirements to text to avoid confusion with C37.100.1 and IEC 62271-1
6.103	TRV	➢ Updated text to harmonize with C37.04, C37.06 and IEC. Some of these changes are still pending ➢ Also pending is update of TRV values to harmonize with CB stds.
6.104	Critical current tests	➢ Clarified test circuit for T10 and T05 tests.
6.110	Control element surge withstand capability (SWC)	➢ Added IEC standards as alternatives but had to also add Table 17 to render IEEE and IEC methods equal
6.111	Simulated surge arrester operation tests	➢ Corrected recommended test circuit ➢ Adjusted test values consistent with corrected circuit.
6.112	Other tests	➢ Deleted clause (IEC request)
Several annexes	Organization	➢ Added introduction paragraphs and Subclause numbering (IEEE Editorial request)
Annex E	Tolerances of test quantities	➢ Revised and updated table
Annex K	Comparison of terms	➢ Revised and clarified

Annex C:
Discussion Questions - C37.60/D5.3

Clause	Subject	Question or Comment
5.13	Degrees of Protection	➢ Application to UG and OH clarified/modified ➢ Reference to IEC 60529
5.13 and Annex M	Degrees of Protection - Coating requirements	➢ C57.12.28 - Informative ➢ New informative Annex M
6.2.2 and Tables 1 & 2	Wet Test Procedure	➢ IEC rated voltages tested at dry test voltage level and for 60 s duration ➢ IEEE rated voltages tested at reduced test voltage level and for 10 s duration ➢ IEC request
6.101	Switching Tests	➢ Reference to normal load and transformer switching deleted ➢ Capacitor switching of lines and cable expanded ➢ Introduce Class C1 and C2 restrike probability levels ➢ Eliminated reference to IEEE 1247
6.103	Short Line Fault testing	➢ IEC has requested that this requirement be added ➢ Would be an new and added test expense
6.103	50 Hz vs. 60 Hz qualification testing	➢ IEC has requested that this requirement be added ➢ Would be an new and added test expense
6.103	TRV	➢ 2^{nd} & 3^{rd} phase to clear topology ➢ IEC issue on effectively grounded systems
Annex L	Cutout Devices	➢ Shall we include these devices in the standard?

Annex D:
Discussion Points - Cutout Device/Technology

KEY QUESTION: What is the best place in the IEEE standards for the cutout interrupting device? Where does it go - recloser standard, annex of recloser standard or in a separate standard? Core issue of discussion?

NOTE: The following text is a summary of the points of discussion and do not necessarily constitute agreement among all of the Working Group members or of the WG as a whole.

- Viable options.
    - Place specification of the cutout device in the annex.
    - Develop a new standard devoted to the cutout device
    - Re-arrange the present standard in a different fashion to incorporate this technology
    - Remove the fault interrupter from the present standard and develop a new standard for fault interrupters and a new standard for the cutout device (technology).
    - Introduce the maximum number of reclose operations as a "rating" and include on the nameplate.
- Needs to address the needs of the user.
- Does the technology meet the user's expectations of C37.60?
- Discussed properties of a recloser:
    - It recloses - closes into fault
    - It detects and interrupts fault current - Time current curve capability
    - Lock out
    - Dielectric capability - after sequence
    - Switches load current
    - Standard operating duty
    - Non-reclosing feature
    - Multiple shots to lock out (Number of operations not spelled out in the definition.)
    - Close into fault
    - Resets its operations back to zero
- By putting new device in the standard, are we reducing the standard; expanding it to cover other equipment is an attempt to water down the standard. Does it belong in this standard or does it deserve a standard of its own?
    - Note: present content requires only two shots. One open and one time delay.
- Meets definition of a recloser in the definitions clause 3.2.
    - Note – mentioned that for switching tests - meets the BIL content.
- Does the new technology comply with what we have or do we need to change the standard to incorporate it. Is the problem the way the standard is different or the way it is actually written? Sequence - IEC - a reclose cycle for a circuit breaker is OCOCO. They

have a problem with a recloser standard that has a lower requirement for a sequence than an optional requirement for a circuit breaker. In this standard, that is not said but it is normal in the IEC world - goes in, countries may object.

- Testing discussion – existing and potential additional tests. Tests that would have to be changed, modified, or added to accommodate the new technology were presented and discussed.
- Fault interrupters also included. Not called a recloser - two distinct devices. This is defined in the title of the document and the nameplate of the device. This has been accepted by the IEC committee that the same standard is describing reclosers and fault interrupters. 61035. On the one side, we have the recloser with no complete unit of operation and the other side with fault reclosing, maybe more? Why should this standard not cover an OCO recloser?
- Recloser standard has evolved to accommodate new technology. Acceptance of new technology into standards could facilitate application.
- The new device has an operating sequence that meets some of our needs. Functionality is very closely aligned with functionality of a recloser. Specific tests that are required of a recloser that the new technology could not meet then certainly we should look at that and look that how it may affect this new technology - may have to adjust our perspective - look at the tests and have a discussion about it. New technology appropriately consistent with a recloser from the user perspective.
- In the present form the document covers several varied technologies.
- By having technologies incorporated, that maybe outside of the recloser definition, are we diluting the intent of the document?
- Specific utility operating practices - do not belong in the standard - describing capabilities. Describe capability of recloser standard - 4 shots.

- The number of operations in the sequence is a function of the application of the device. Standard needs to be technology neutral and reflect the application and the applications are driven by the customer.
- A concern from application standpoint, is the reset time so short, it's really not the same recloser device as what we have had in the past - raises the question as resets in a short time interval, could have tree branches brushing the line and in a few seconds causing reset(s).
- What is the reset time? - reset time is 15 seconds with new technology.
- 15 sec vs. 2 min will cause a concern - being shorter and not know what the long-term impact could be.