

Title: C37.04 TF - 3 Phase Line Faults and Critical Currents

Agenda Listing: 3-Phase Phase Line Faults, Critical Currents, and SLF Testing Implications

Chair: Xi Zhu for (Roy Alexander (not present))

Location: Galveston

Participants: 20 members  
23 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.
- 3.) The Chair reviewed the posted MOM from the previous meeting held in San Diego in the Fall of 2012. Note: For convenience, the MOM from the San Diego meeting is posted below because there were several comments made to the information provided at the meeting:
- 4.) The following topics were listed in the MOM:
  - a.) Phase Line Faults
  - b.) Critical Currents
- 5.) Xi said the 3 phase line faults task force (TF) from his understanding concluded work and the recommendation of the Task Force was for the topic of 3 Phase Line Faults to be given back to C37.04 working group.
- 6.) For the “Critical Currents” portion of the meeting, there was much confusion from the MOM from San Diego. It was not exactly clear if some of the information was a proposal or what was actually discussed at the meeting in San Diego. In particular, the guests and members at the meeting discussed critical currents but they did not remember agreeing to some information in the following statement:

“When the minimum arcing time of a T30 test exceeds the minimum arcing time of a T60 test by more than  $\frac{1}{4}$  cycle, then tests shall be made at T45 and T20 with time delay  $<0.1 \mu\text{s}$ . (3 shots each) Also, if the minimum arcing time of a T10 test is more than  $\frac{1}{4}$  cycle longer than a T30 test, t5 and t20 tests (3 shots each) shall be done with a time delay  $<0.1 \mu\text{s}$ ”
- 7.) There was confusion if we settled on  $\frac{1}{4}$  cycle since IEC uses  $\frac{1}{2}$  cycle. Similarly, others did not remember if we concluded to use  $<0.1 \mu\text{s}$  time delay.
- 8.) Xi said the posted information may be a mixture of information from meeting notes plus a proposal for discussion by Roy.

9.) Xi mention the recommendation from what he and some others remember was to move “Critical Currents” discussion into C37.09 since this may affect testing of the breakers. Additionally, “Critical Current” was already discussed to be included as a topic for C37.09 in the meeting in San Diego.

10.) Ken Edwards said this was not the proper procedure for a task force of C37.04 to recommend Critical Currents be taken into another standard such as C37.09, when the TF was assigned as part of C37.04

11.) There was much discussion and Ken questioned (and maybe some others) the validity of the task force (TF) since it was not listed in the “IEEE PES Switchgear Committee Meeting” booklet. The meeting was however listed in the IEEE/PES Switchgear Committee Meeting Schedule of Events”

12.) There was a concern that the scope or title of the meeting wasn’t “advertised” properly and was misleading and may have excluded or misinformed others that may want to be at the meeting since, apparently, the work was moved back into C37.04 and/or C37.09. That is, interested members of such committees for C37.04 and C37.09 may not be in the meeting.

13.) The meeting nearly disbanded but technical activity resumed.

14.) There was a motion to split the apparent proposal information out of the meeting notes from San Diego. That way the MOM could be approved and the discussion could take place for technical items listed (e.g.  $\frac{1}{4}$  vs  $\frac{1}{2}$  cycle and  $< 0.2$  us time delay). The motion was made but then there was a question if a TF needed to follow such a motion, if it was not apparently a valid TF.

15.) It was decided the technical discussion should continue due to the large number of individuals in the room.

16.) Leslie Falkenham made a motion to make  $\frac{1}{4}$  cycle as  $\frac{1}{2}$  cycle to match IEC. The motion was seconded by Anne Bosma. The Task Force voted and the motion was rejected: (10 in favor and 14 against)

17.) Some said that it was not fair to even vote on the motion without understanding the intentions of Roy Alexander since he was not present.

18.) Mike Skidmore asked how Cigre (IEC) determined  $\frac{1}{2}$  cycle was a valid range to look for critical currents.

19.) Jon Rogers questions if the committee was even looking at the correct issues when it comes to critical currents.  $\frac{1}{2}$  cycle at 60Hz may automatically be a more difficult test than at 50Hz

20.) Denis Defournet and some others attempted to explain why  $\frac{1}{2}$  cycle was selected.

21.) Meeting was adjourned

## **AGENDA and MOM from San Diego (Duplicated for Convenience)**

### **C37.04 TF on 3 Phase Line Faults and Critical Currents Synopsis of Meeting on 2012 2 October San Diego CA**

Attendance: 17 Members and 33 Guests

#### **3 Phase Line Faults**

Subject covered at the spring meeting & recommendation given to C37.04 WG

#### **Critical Currents**

There was considerable discussion around the IEC method for finding critical currents.

A slight modification of our previous discussions is below.

Since this is only a test requirement it needs to be taken up by the C37.09WG

The players can remain the same but report to C37.09 WG. If it is acceptable to the chair of the C37.09 WG, we can just change our reporting.

Grace & Peace

Roy Alexander

Chair 3 phase line fault and Critical currents TF

#### **Critical Currents:**

When the minimum arcing time of a T30 test exceeds the minimum arcing time of a T60 test by more than  $\frac{1}{4}$  cycle, then tests shall be made at T45 and T20 with time delay  $<0.1 \mu\text{s}$ . (3 shots each) Also if the minimum arcing time of a T10 test is more than  $\frac{1}{4}$  cycle longer than a T30 test, t5 and t20 tests (3 shots each) shall be done with a time delay  $<0.1 \mu\text{s}$

Passing these tests indicates the breaker IS ok.

Note: We should check the language in C37.14. Apparently those dc breakers Always have critical currents and the manufacturer has to find the critical current and demonstrate that the breaker will work there.

Grace & Peace

Roy Alexander

### Meeting Roster (Galveston)

| First Name           | Last Name   | Company Name                        |
|----------------------|-------------|-------------------------------------|
| Mauricio             | Aristizabal | ABB                                 |
| Roy                  | Ayers       | Nashville Electric Service          |
| Katrin               | Baeuml      | Schneider Electric                  |
| Stan                 | Billings    | Mitsubishi Electric PP              |
| Anne                 | Bosma       | ABB AB                              |
| Cody                 | Brehm       | American Transmission Company       |
| Arben                | Bufi        | HITACHI HVB, INC.                   |
| Donald               | Cantrelle   | Georgia Power                       |
| Gilbert              | Carmona     | Southern California Edison          |
| Stephen              | Cary        | Eaton Corporation                   |
| Stephen              | Cary        | Eaton Corporation                   |
| Steven               | Chen        | Chenhouse North America             |
| Michael              | Crawford    | Mitsubishi Electric                 |
| Jerod                | Day         | Vacuum Interrupters Limited         |
| Patrick              | Di Lillo    | Consolidated Edison Co. of NY, Inc. |
| Denis                | Dufournet   | Alstom Grid                         |
| Ken                  | Edwards     | Bonneville Power Administration     |
| Leslie               | Falkingham  | Vacuum Interrupters Limited         |
| John                 | Hall        | Tennessee Valley Authority          |
| Helmut               | Heiermeier  | ABB                                 |
| Victor               | Hermosillo  | Alstom Grid                         |
| Jingxuan<br>(Joanne) | Hu          | RBJ Engineering Corporation         |
| Todd                 | Irwin       | Alstom Grid Inc                     |
| Sandeep              | Kulkarni    | CG                                  |
| Li                   | Liu         | Eaton                               |
| Bjorn                | Lofgren     | Siemens Energy                      |
| Vincent              | Marshall    | Southern Company Services           |
| Ricardo              | Martinez    | CFE-LAPEM                           |
| Tom                  | Mulcahy     | Dominion                            |
| Henk te              | Paske       | Kema NL                             |
| Thomas               | Pellerito   | DTE Energy                          |
| Alan                 | Peterson    | Utility Service Corporation         |
| Lise                 | Phan        | Parcific Gas and Electric Company   |
| Frank                | Ricard      | FirstPower Group LLC                |
| Anthony              | Ricciuti    | Eaton Corporation                   |
| Jon                  | Rogers      | Siemens Energy, Inc                 |
| Roderick             | Sauls       | Southern Company Services           |
| Carl                 | Schuetz     | American Transmission Company       |

|          |             | (ATC)                  |
|----------|-------------|------------------------|
| Sushil   | Shinde      | ABB Inc.               |
| Michael  | Skidmore    | AEP                    |
| Hongbiao | Song        | Bechtel                |
| Trinity  | Sorvari     | Enbridge               |
| Vernon   | Toups       | Siemens                |
| Jim      | Van de Ligt | CANA High Voltage Ltd. |
| Xi       | Zhu         | GE Energy Management   |

Note: Members, Guests, etc... are not listed in the meeting roster because it is not required for a Task Force



# **C37.04 TF on 3 Phase Line Faults and Critical Currents**

Chair: Roy Alexander  
(presented by Xi Zhu)  
Secretary: Mike Skidmore

# Agenda

- Introductions
- WG Membership / Guest (Sign in sheet)
- Topics for Discussion
  - **Review and Approve last Meeting Minutes**
    - 3 phase line fault has come to a resolution. Recommendation given to C37.04 WG
    - Agreed on IEEE method of finding Critical Current
      - Slightly different from IEC: use  $\frac{1}{4}$  cycle rather than  $\frac{1}{2}$  cycle as minimum arcing time difference between adjacent duties as criteria.
    - Proposal for further testing if critical current is identified.
    - Critical current will be part of C37.09 WG discussion.
    - Motion to approve MOM.
  - **Open Discussions**