RODE C37.68 Controls Working Group
Meeting Minutes
October 16\textsuperscript{th} and 17\textsuperscript{th}, 2018 – Kansas City, MO

\textbf{Chair:} Paul Found \hspace{1cm} \textbf{Vice-Chair:} Karla Trost

\section*{Meeting Minutes}

1. \textbf{Call to Order} \hspace{1cm} Paul Found
   Session 1 was called to order at 4:16PM.

2. \textbf{6.3.2 Call for Patents} \hspace{1cm} Paul Found
   Information regarding IEEE's Patent Policy provided and slides 1 through 4 were shown. The chair provided an opportunity for participants to identify patent claim(s)/patent application claim(s) and/or the holder of patent claim(s)/patent application claim(s) of which the participant is personally aware and that may be essential for the use of that standard
   No responses were given.

3. \textbf{Introduction of Members and Guests} \hspace{1cm} Karla Trost
   Self-introductions were made by the attendees.

4. \textbf{Attendance and Quorum Check} \hspace{1cm} Karla Trost
   Sign-in sheets were circulated. Quorum was verified.
   There were 30 people present at Session 1, 12 of which were members.
   There were 34 people present at Session 2, 11 of which were members.
   Two people requested membership and were granted.

5. \textbf{Approval of Agenda} \hspace{1cm} Paul Found
   No changes to the agenda were requested.
   Brendan K motioned, Tim R seconded and the agenda was approved.

6. \textbf{Approval of Previous Minutes} \hspace{1cm} Paul Found
   \url{http://www.ewh.ieee.org/soc/pes/switchgear/minutes/2018-1/S18RODEa2REV0.pdf}
   No comments on the minutes. Anil motioned and Travis seconded. The minutes were approved as written.

7. \textbf{Review Action Items} \hspace{1cm} Paul Found
   - (Action Item from Fall 2017): There was an additional action item to reach out to the relay group. Paul has contacted the IEEE PSRC secretary.
   - PSRC provided contact information/ process for how to liaison and request reviews.
The groups as a whole will review the technical report material sections and divide it into application specific sections. Chair will send out the list of items to all members/guests and each person to indicate which applications apply. Tim Royster will combine the results.

- Completed and sent out to participants.

A group will write the definition of a control (keeping in mind the scope of C37.75 for equipment enclosures). Chair will lead. Anil Dhawan, Kate Cummings, Craig Thompson, and Ian Rokser will assist.

- Paul reviewed the work of the group including the separation of control “types” by application.
- The group’s proposed definition:
  - “A microprocessor-based device which interfaces between the controlled apparatus and local or remote operators, used for manually or automatically initiating switching, monitoring, setting or adjusting operating parameters.
  - A control includes a relay mounted inside an enclosure separate from the controlled apparatus and providing environmental protection, internal consolidation of relay wiring into one or more connectors, and any necessary power supplies to operate connected switchgear.”

Group’s Recommendation: to exclude the integrated controls (pole & vault) from C37.68 scope (for now at least).

- Discussion about examples where the control is “integrated” but user accessible/replaceable.
  - User concern that these environments can be more severe for the control and would like to make sure they are included.
  - Discussion that some of these include communication/interface – so they should be included.
  - Discussion about the impact on the scope of the PAR to include the integrated controls.
  - Discussion about the fact that integrated controls are often covered by the apparatus standard (reclosers/fault interrupters) – how big is the gap requiring development of unique requirements/tests?
  - Tim Royster made a motion to accept the recommendation (to exclude the integrated controls.) Anil 2nd.
    - Aye (6)/ Nay (6) – Did not pass
    - Nenad proposed having a group of manufacturers provide a list of unique tests for integrated controls. Paul (Lead), Karla (G&W), Peter (Hubbell), Stephen (Siemens), Pete (S&C)

Questions for group:

- Are voltage regulator and capacitor controls included under the reach of distribution switchgear controls?
  - Brad Lewis advised that C57.15 was recently released and covers Voltage Regulator Controls.
- To what extent do we need to define ‘distribution switchgear’?
- is the term ‘relay’ appropriate in the definition?
  - For now, will leave it.

- Come up with the list of test requirements for each chapter before the fall meeting. The teams are listed below
  - Report section 2 – Tim Royster, Craig Thompson, Anil Dhawan
    - Vibration, shock, bump, seismic tests overlap chapter 2 & 3.
- Need access to IEC 60529, IEC 60068-2-1/2/78/30, NEMA 250 standards.
  - IEEE SA is working on getting us the IEC documents.
- Report section 3 – Craig Thompson, Ian Rokser, Brad Lewis, Travis Johnson
  - No Report – carry over to the spring session
- Report section 4 – Karla Trost, Mark Feltis, Ian Rokser, Brendan Kirkpatrick
  - Discussion: Set-up recommendation (should the control be connected to the apparatus for all tests):
    - Relay manufacturers do everything secondary (no apparatus)
    - One manufacturer has seen different results with and without the apparatus connected.
    - Real world environment is the control connected to the apparatus. A simulation would have to fully mimic how the apparatus would impact the control.
    - Testing as a system would require testing of every combination?

Meeting was put on hold at 5:57PM.
Meeting was re-started on 10:16AM on 10/17/2018.

- Control cable design – Request to the group – is anyone aware of a specific standard that exists for this type of test.
  - Discussion: Are we looking at worst case now or a more general scenario?
- May want to document in 37.68 how to show the results of all the tests.
- Discussion on 4.6.4 –
  - Discussion on VFI’s with motor and devices that exist today that do not have independent position indication.
  - If we want to have something like this in the 37.68 standard, we will need a group to re-write this requirement.
- Discussion 4.6.4 – Apparatus / control alignment.
  - Does not require the control to automatically move a motor to align with the main switch apparatus.
  - Control should have indication of “all positions” and therefore show that it is in a misalignment.
  - Recommendation from discussion that we do not include this statement in the standard, but we should include something in the HMI section: The control must show the status of the apparatus (all feedback from the apparatus.)
- Report section 6 – Kate Cummings, Mark Feltis, Brendan Kirkpatrick, Paul Found
  - Testing:
    - Burn-in testing is recommended
    - Performance testing (production tests) to show all functionality
    - Performance testing for all interface connections (see powerpoint)
    - Must maintain enclosure integrity with all interfaces/entrances
    - List of possible signals/interfaces (see powerpoint)
  - Discussion:
• On the High Temperature testing.
• There is confusion on the bullet that says: “Perform testing at the furthest point from the switch.” Paul and Kate to provide more explanation.

8. New Items
   o Continuation of draft:
     o Need a small group to take the applications and the sections and draft the applicability/summary table and document outline.
       ▪ Paul, Tim, and Jacob will work on this.
       ▪ Targeting mid-November.
     o The recommendation is a for a group to start drafting the standard language.
       ▪ Comment that the manufacturers have the existing expertise for this item.
       ▪ Karla, Ian, Chris, Mark, Peter A (Peter to find S&C resource).
   o If copies of standards are needed, Erin (IEEE-SA) can provide copies and they will be located on the imeet (central desktop) for working group members use.
   o A member brought up C57.148-2011. Is there information in this that might be useful?
     o Anil and Paul will review and provide feedback.

9. Next Steps
   o Project Milestones
     o Control Definition, Test Requirements by Application, and Initial list of requirements Fall 2018
     o Draft verbiage/ tests: Spring and Fall 2019
     o Compile initial ballot draft: Spring 2020
     o Draft for Initial Sponsor Ballot: December 2020

10. Next meeting:
   o The next working group meeting will take place at the Spring Switchgear Committee Meeting the week of April 28, 2018 in Burlington, VT.

11. Adjournment.
    Meeting was adjourned at 11:25AM.
### Annex 1: Attendance

<table>
<thead>
<tr>
<th>Role</th>
<th>First Name</th>
<th>Last Name</th>
<th>Company</th>
<th>10/16/2018</th>
</tr>
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<tbody>
<tr>
<td>Chair</td>
<td>Paul</td>
<td>Found</td>
<td>BC Hydro</td>
<td>X</td>
</tr>
<tr>
<td>Vice-Chair</td>
<td>Karla</td>
<td>Trost</td>
<td>G&amp;W Electric</td>
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<tr>
<td>Member</td>
<td>Chris</td>
<td>Ambrose</td>
<td>Federal Pacific (Div. of Electro-Mechanical Corp.)</td>
<td>X</td>
</tr>
<tr>
<td>Member</td>
<td>Anil</td>
<td>Dhawan</td>
<td>ComEd</td>
<td>X</td>
</tr>
<tr>
<td>Member</td>
<td>Mark</td>
<td>Feltis</td>
<td>Schweitzer Engineering Laboratories, Inc</td>
<td>X</td>
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<tr>
<td>Member</td>
<td>Travis</td>
<td>Johnson</td>
<td>Xcel Energy</td>
<td>X</td>
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<tr>
<td>Member</td>
<td>Brendan</td>
<td>Kirkpatrick</td>
<td>Southern California Edison</td>
<td>X</td>
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<td>Member</td>
<td>Benson</td>
<td>Lo</td>
<td>Toronto Hydro</td>
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<td>Member</td>
<td>Peter</td>
<td>Meyer</td>
<td>S&amp;C Electric Company</td>
<td>X</td>
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<tr>
<td>Member</td>
<td>Jacob</td>
<td>Midkiff</td>
<td>Dominion Energy</td>
<td>X</td>
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<td>Member</td>
<td>Stephen</td>
<td>Pell</td>
<td>Siemens</td>
<td>X</td>
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<td>Ian</td>
<td>Rokser</td>
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<td>Creach</td>
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<td>Guest</td>
<td>Frank</td>
<td>DeCesaro</td>
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<td>Gieger</td>
<td>Thomas &amp; Betts</td>
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Annex 2: Powerpoint
(Following)
Participants have a duty to inform the IEEE

- Participants **shall** inform the IEEE (or cause the IEEE to be informed) of the identity of each holder of any potential Essential Patent Claims of which they are personally aware if the claims are owned or controlled by the participant or the entity the participant is from, employed by, or otherwise represents.

- Participants **should** inform the IEEE (or cause the IEEE to be informed) of the identity of any other holders of potential Essential Patent Claims.

Early identification of holders of potential Essential Patent Claims is encouraged.
Ways to inform IEEE

• Cause an LOA to be submitted to the IEEE-SA (patcom@ieee.org); or

• Provide the chair of this group with the identity of the holder(s) of any and all such claims as soon as possible; or

• Speak up now and respond to this Call for Potentially Essential Patents

If anyone in this meeting is personally aware of the holder of any patent claims that are potentially essential to implementation of the proposed standard(s) under consideration by this group and that are not already the subject of an Accepted Letter of Assurance, please respond at this time by providing relevant information to the WG Chair
Other guidelines for IEEE WG meetings

- All IEEE-SA standards meetings shall be conducted in compliance with all applicable laws, including antitrust and competition laws.
- Don’t discuss the interpretation, validity, or essentaility of patents/patent claims.
- Don’t discuss specific license rates, terms, or conditions.
  - Relative costs of different technical approaches that include relative costs of patent licensing terms may be discussed in standards development meetings.
  - Technical considerations remain the primary focus
- Don’t discuss or engage in the fixing of product prices, allocation of customers, or division of sales markets.
- Don’t discuss the status or substance of ongoing or threatened litigation.
- Don’t be silent if inappropriate topics are discussed ... do formally object.

Patent-related information

The patent policy and the procedures used to execute that policy are documented in the:

- IEEE-SA Standards Board Bylaws
  (http://standards.ieee.org/develop/policies/bylaws/sect6-7.html#6)
  (http://standards.ieee.org/develop/policies/opman/sect6.html#6.3)

Material about the patent policy is available at
http://standards.ieee.org/about/sasb/patcom/materials.html

If you have questions, contact the IEEE-SA Standards Board Patent Committee Administrator at patcom@ieee.org
Self-Introductions
Agenda

1. Call to Order
2. 6.3.2 Call for Patents
3. Introduction of Members and Guests
4. Attendance and Quorum Check
5. Approval of Agenda
6. Approval of Previous meeting minutes
7. Review of Action Items
   • (Action Item from Fall 2017): reach out to the relay group.
   • A group will write the definition of a control
   • The groups as a whole will review the technical report material sections and divide it into application specific sections.
   • Come up with the list of test requirements for each chapter before the fall meeting
8. New Items:
9. Next Meeting
   week of April 28, 2018 in Burlington, VT
10. Adjournment
Approval of Minutes

http://www.ewh.ieee.org/soc/pes/switchgear/minutes/2018-1/S18RODEa2REV0.pdf
Action Item:

Discussion with Relay Group

Power System Relaying and Control Committee (PSRC) Chair (Pratap Mysore)

- Visit www.pes-psrc.org to identify subcommittee to liason with.

- Send questions to the officers to connect with subcommittee.

RECOMMENDATION: C37.68 will send PAR & drafts to PSRC for review (to share with participants – ask for potential conflicts as we develop our draft.)
What is a control?

Pole Mounted

Pad Mounted

Wet/Dry Vaults
"A microprocessor-based device which interfaces between the controlled apparatus and local or remote operators, used for manually or automatically initiating switching, monitoring, setting or adjusting operating parameters.

A control includes a **relay** mounted inside an enclosure **separate from the controlled apparatus** and providing environmental protection, internal consolidation of **relay** wiring into one or more connectors, and any necessary power supplies to operate connected **switchgear**."
Definition of Control

What equipment is covered by PAR Scope?

PAR Scope:
• This standard applies to microprocessor-based devices employed in distribution switchgear typically mounted on power poles, in wet or dry vaults, or in pad mounted switchgear enclosures.
• This standard does not apply to microprocessor-based devices employed in high voltage circuit breakers or metal-enclosed switchgear.
Definition of Control

What is a control?

Recommendation: to exclude the integrated controls (pole & vault) from C37.68 scope (for now at least).

Questions:

a. are voltage regulator and capacitor controls included under the reach of distribution switchgear controls?

b. to what extent do we need to define distribution switchgear?

c. what is the risk of leaving the C37.68 scope non-specific to VRs (ie could include, but does not specifically exclude).

d. is the term relay appropriate in the definition?
### Action Item:

**Sections by Application Completed and consolidated**

[Link to composite file on imeet central]
Action Item:

Test Requirements: Section 2

- Vibration, shock, bump, seismic tests overlap chapt 2 & 3.
- Need access to IEC 60529, IEC 60068-2-1/2/78/30, NEMA 250 standards.
Action Item:
Test Requirements: Section 3
Action Item:

Test Requirements: Section 4
# Electrical Surges/Transients

## Recommended:

<table>
<thead>
<tr>
<th>Topic</th>
<th>Standard</th>
<th>Recommendation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Surges</td>
<td>C37.60/SSAO</td>
<td>Suitable for overhead devices, also listed in 62. Can be covered by the product std.</td>
</tr>
<tr>
<td>Surge Withstand Capability</td>
<td>C37.90.1</td>
<td>Follow the standard; alternatively IEC 61000-4-4 and IEC 61000-4-18 with modifications as in C37.60</td>
</tr>
<tr>
<td>Conducted Immunity</td>
<td>IEC 61000-4-6</td>
<td>Table 1 – Level 3</td>
</tr>
<tr>
<td>Surge Immunity</td>
<td>IEC 61000-4-5</td>
<td>Table 1 – Level 4</td>
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<tr>
<td>ESD</td>
<td>C37.90.3</td>
<td>8kV Contact 15kV Air Discharge</td>
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## Electrical Surges/Transients

### Recommended:

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<thead>
<tr>
<th>Topic</th>
<th>Standard</th>
<th>Recommendation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Emission - RF</td>
<td>EN 55011</td>
<td>Class A, Group 1</td>
</tr>
<tr>
<td>Emission – 9k-400GHz</td>
<td>EN 55032</td>
<td>Class A</td>
</tr>
<tr>
<td>Radiated RF Immunity</td>
<td>C37.90.2</td>
<td>35V/m Severity</td>
</tr>
</tbody>
</table>
Set-Up Recommendation

• Team recommends:
For the following standards, tests must be performed with the control connected to the apparatus being monitored/controlled.

  *What standards? Possible:* C37.90.1, C37.90.2, IEC 61000-4-4, IEC 61000-4-6 IEC 61000-4-12

For other tests, the test may be performed with the control connected to the apparatus and/or the I/O of the control must be monitored for issued commands and change of status.
# Safety

**Recommended:**

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<tr>
<th>Topic</th>
<th>Standard</th>
<th>Recommendation</th>
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</thead>
<tbody>
<tr>
<td>Dielectric; Impulse</td>
<td>C37.90</td>
<td>Clause 8</td>
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## Sensor/Apparatus Interface

### Recommended:

<table>
<thead>
<tr>
<th>Topic</th>
<th>Standard</th>
<th>Recommendation</th>
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</thead>
<tbody>
<tr>
<td>EMI/EMC</td>
<td>C37.90.2</td>
<td>Follow the standard</td>
</tr>
<tr>
<td>EMC Ring Waves</td>
<td>IEC 61000-4-12</td>
<td>Must: Level 3 (1kV L/L) Should: Level 4 (2kV L/L)</td>
</tr>
</tbody>
</table>

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*Note: The table above outlines the recommended standards and levels for EMI/EMC and EMC Ring Waves. The recommended standards are C37.90.2 for EMI/EMC and IEC 61000-4-12 for EMC Ring Waves. The recommended levels are Level 3 (1kV L/L) for EMC Ring Waves and Level 4 (2kV L/L) for EMC Ring Waves.*
Set-Up Recommendation

• Team recommends:
Control cabling design should be confirmed as a system over a range of cable lengths and temperatures.

Discussion: What standards may exist for this? Possibly IEEE 789-2013
**Power Supply Quality**

**Recommended:**

<table>
<thead>
<tr>
<th>Topic</th>
<th>Standard</th>
<th>Recommendation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Voltage input ranges</td>
<td>C37.100.1</td>
<td>Table 5</td>
</tr>
</tbody>
</table>
| EMC: Dips/interruptions/ variations| IEC 61000-4-11    | Must: Class 2
|                                    |                   | Should: Class 3             |
| Transients                         | C62.41.2          | Use of Standard waveforms   |
| Surges on Power input              | C62.41.1          | As written                  |

*Note, for these tests, batteries should be removed/disconnected so as to show the control is not dependent on the batteries for operation.*
IEEE C37.100.1 – Table 5

<table>
<thead>
<tr>
<th>Nominal voltage (50/60 Hz) phase (V)</th>
<th>Closing, tripping, and auxiliary functions (V)</th>
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<tbody>
<tr>
<td>120</td>
<td>104 to 127 (See Note 3)</td>
</tr>
<tr>
<td>240</td>
<td>208 to 254 (See Note 3)</td>
</tr>
<tr>
<td>480</td>
<td>416 to 508 (See Note 3)</td>
</tr>
<tr>
<td>Polyphase</td>
<td></td>
</tr>
<tr>
<td>208Y/120</td>
<td>180Y/104 to 220Y/127</td>
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<td>240</td>
<td>208 to 254</td>
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<tr>
<td>480</td>
<td>416 to 508</td>
</tr>
<tr>
<td>480Y/277</td>
<td>416Y/240 to 508Y/292</td>
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</tbody>
</table>

NOTE 1—The numerical references, 1), 2), etc., refer to the points given in 4.8.2.
NOTE 2—Other notes or qualifications may apply; refer to relevant equipment standards.
NOTE 3—See qualifying point 9) listed in 4.8.2.
Table 1 – Preferred test level and durations for voltage dips

<table>
<thead>
<tr>
<th>Class&lt;sup&gt;a&lt;/sup&gt;</th>
<th>Test level and durations for voltage dips (tₚ) (50 Hz/60 Hz)</th>
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</thead>
<tbody>
<tr>
<td>Class 1</td>
<td>Case-by-case according to the equipment requirements</td>
</tr>
<tr>
<td>Class 2</td>
<td>0 % during ½ cycle</td>
</tr>
<tr>
<td></td>
<td>0 % during 1 cycle</td>
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<tr>
<td></td>
<td>70 % during 25/30&lt;sup&gt;°&lt;/sup&gt; cycles</td>
</tr>
<tr>
<td>Class 3</td>
<td>0 % during ½ cycle</td>
</tr>
<tr>
<td></td>
<td>0 % during 1 cycle</td>
</tr>
<tr>
<td></td>
<td>40 % during 10/12&lt;sup&gt;°&lt;/sup&gt; cycles</td>
</tr>
<tr>
<td></td>
<td>70 % during 25/30&lt;sup&gt;°&lt;/sup&gt; cycles</td>
</tr>
<tr>
<td></td>
<td>80 % during 250/300&lt;sup&gt;°&lt;/sup&gt; cycles</td>
</tr>
<tr>
<td>Class X&lt;sup&gt;b&lt;/sup&gt;</td>
<td>X</td>
</tr>
<tr>
<td></td>
<td>X</td>
</tr>
<tr>
<td></td>
<td>X</td>
</tr>
<tr>
<td></td>
<td>X</td>
</tr>
<tr>
<td></td>
<td>X</td>
</tr>
</tbody>
</table>

<sup>a</sup> Classes as per IEC 61000-2-4; see Annex B.

<sup>b</sup> To be defined by product committee. For equipment connected directly or indirectly to the public network, the levels must not be less severe than Class 2.

<sup>c</sup> “25/30 cycles” means “25 cycles for 50 Hz test” and “30 cycles for 60 Hz test”.

Table 2 – Preferred test level and durations for short interruptions

<table>
<thead>
<tr>
<th>Class&lt;sup&gt;a&lt;/sup&gt;</th>
<th>Test level and durations for short interruptions (tₚ) (50 Hz/60 Hz)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Class 1</td>
<td>Case-by-case according to the equipment requirements</td>
</tr>
<tr>
<td>Class 2</td>
<td>0 % during 250/300&lt;sup&gt;°&lt;/sup&gt; cycles</td>
</tr>
<tr>
<td>Class 3</td>
<td>0 % during 250/300&lt;sup&gt;°&lt;/sup&gt; cycles</td>
</tr>
<tr>
<td>Class X&lt;sup&gt;b&lt;/sup&gt;</td>
<td>X</td>
</tr>
</tbody>
</table>

<sup>a</sup> Classes as per IEC 61000-2-4; see Annex B.

<sup>b</sup> To be defined by product committee. For equipment connected directly or indirectly to the public network, the levels must not be less severe than Class 2.

<sup>c</sup> “250/300 cycles” means “250 cycles for 50 Hz test” and “300 cycles for 60 Hz test”.
Several standards list specific pass criteria and others have options for allowable responses. We should make a statement for those cases:

9 Evaluation of test results

The test results shall be classified in terms of the loss of function or degradation of performance of the equipment under test, relative to a performance level defined by its manufacturer or the requestor of the test, or agreed between the manufacturer and the purchaser of the product. The recommended classification is as follows:

a) normal performance within limits specified by the manufacturer, requestor or purchaser;
b) temporary loss of function or degradation of performance which ceases after the disturbance ceases, and from which the equipment under test recovers its normal performance, without operator intervention;
c) temporary loss of function or degradation of performance, the correction of which requires operator intervention;
d) loss of function or degradation of performance which is not recoverable, owing to damage to hardware or software, or loss of data.
Items to Discuss with WG – 4.6.4

• The apparatus position indicator must be all the time corresponding to the local control indication of the same apparatus. Each position shall have an independent indication (ex.: 1 for OPEN and 1 for CLOSE).
  
  – Needs to be discussed as a larger group and needs to cover all of the variations (motors on VFI, 52A/not 52A)
Items to Discuss with WG – 4.6.4

• When a local operator has to physically connect the control cable to an apparatus and in the case of a difference between both positions indications, the apparatus must have priority on the control position. The control adapts itself to the position of the apparatus.

  — Possible “safety” concern.
Test Requirements: Section 6

Hardware Interface Considerations

- Burn-in testing is recommended (final assembly).

- Attach some performance tests for all interface connections (to motors, to sensors, to power supply, and control to the apparatus), gas pressure/density, position, temperature, and remote interlocks.

- Include routine system test with motors in place. All designed functions must be functionally tested as a production test.

- Perform testing at the furthest point from the switch, within the control whether that is a printed circuit board or a relay.

- The manufacturer shall maintain switch/motor/control enclosure environmental ratings when bringing signal into and out of the control enclosure.
The referenced signals include, but are not limited to:

- mechanism position indication
- magnetic actuator status
- magnetic actuator commands
- current transformer secondary connections
- voltage sensing connections
- low pressure/density switch statuses
- motor status
- motor commands
- temperature signals
- remote signals (i.e. interlocks, hardwire SCADA connections)
- control power
- battery power (when batteries are mounted remotely from the control cabinet)
Action Item:

Test Requirements: Section 6

Type Tests
The minimum type tests that shall be performed to verify the maintaining of the environmental standards are:
submergibility rating (i.e. if rating it to IP68, the length of time and depth of submergibility; NEMA 6P)
hot temperature testing IEC60068-2-2-2007, 16 hours at 85C
cold temperature testing IEC60068-2-1-2007, 16 hours at -40C
Production Tests
There shall be required testing of the interfaces between switch/motor/control/remote signals. Testing must include (but is not limited to) the following (as applicable):
Verification of mechanism position indication (for all mechanism positions) within the control cabinet
Verification of SF pressure status within the control cabinet
Verification of motor status within the control cabinet
Confirm control reads correct phase and magnitude of current transformer secondary connections
Confirm control reads correct phase and magnitude of voltage sensing connections
Verify temperature signals within the control cabinet
Verify all remote signals (i.e. interlocks, hardwire SCADA connections)
Verify control power at initial landing point and at the power supply within the control.
Verify battery power (when batteries are mounted remotely from the control cabinet)
New Business:

**C37.68 Draft:**
1. Two volunteers to create the summary table
2. One group to draft the requirements. One lead needed.

**Format decided from Fall 2017:**

<table>
<thead>
<tr>
<th>Clause X.0</th>
<th>X.1 Application</th>
<th>X.2 Design</th>
<th>X.3 Testing</th>
</tr>
</thead>
<tbody>
<tr>
<td>eg. Environmental</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>eg. Condensation</td>
<td>Shall be designed to mitigate</td>
<td>IEC 60068-2-38 – 2009 Enviro Testing Hi Temp/Humidity, Cold</td>
<td></td>
</tr>
</tbody>
</table>
New Business:

**Access to Standards for Development** – Erin has provided standards

**Other control standards:** C57.148 – ask for one volunteer on the C57 transformer committee to review.