RODE C37.68 Controls Working Group Meeting Minutes

October 16th and 17th, 2018 – Kansas City, MO

Chair: Paul Found **Vice-Chair**: Karla Trost

Meeting Minutes

1. Call to Order Paul Found

Session 1 was called to order at 4:16PM.

2. 6.3.2 Call for Patents 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. Introduction of Members and Guests

Self-introductions were made by the attendees.

4. Attendance and Quorum Check 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. Approval of Agenda Paul Found

No changes to the agenda were requested.
Brendan K motioned, Tim R seconded and the agenda was approved.

6. Approval of Previous Minutes Paul Found

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. Review Action Items 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

- Continuation of draft:
  - 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.
  - 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).**
- 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.
- A member brought up C57.148-2011. Is there information in this that might be useful?
  - Anil and Paul will review and provide feedback.

9. Next Steps

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

10. Next meeting:

- 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

Role	First Name	Last Name	Company	10/16/2018
Chair	Paul	Found	BC Hydro	X
Vice-Chair	Karla	Trost	G&W Electric	X
Member	Chris	Ambrose	Federal Pacific (Div. of Electro-Mechanical Corp.)	X
Member	Anil	Dhawan	ComEd	X
Member	Mark	Feltis	Schweitzer Engineering Laboratories, Inc	X
Member	Travis	Johnson	Xcel Energy	X
Member	Brendan	Kirkpatrick	Southern California Edison	X
Member	Benson	Lo	Toronto Hydro	X
Member	Peter	Meyer	S&C Electric Company	X
Member	Jacob	Midkiff	Dominion Energy	X
Member	Stephen	Pell	Siemens	X
Member	Ian	Rokser	Eaton Corp	X
Member	Timothy	Royster	Dominion Virginia Power	X
Member	Francois	Soulard	Hydro-Quebec	X
Member	Nenad	Uzelac	G&W Electric	X
Guest	Peter	Agliata	Hubbell Power Systems	X
Guest	Edwin	Almeida	Southern California Edison	X
Guest	Thomas	Ballard	Hubbell Power Systems	X
Guest	David	Beseda	S&C Electric Co.	X
Guest	Antone	Bonner	PAS Consulting	X
Guest	Mohit	Chhabra, Ph.D.	S&C Electric	X
Guest	Randall	Creach	AZZ Switchgear Systems	X
Guest	Frank	DeCesaro	Eaton's Power Systems Division	X
Guest	Michael	Flack	Southern Company Services, Inc.	X
Guest	Jeffrey	Gieger	Thomas & Betts	X
Guest	Christian	Heinrich	Siemens AG	X
Guest	Harold	Hirz	Thomas and Betts	X
Guest	John	Kaminski	Siemens	X
Guest	Ryan	Kowdley	Pacific Gas & Electric	X
Guest	Bradley	Lewis	AEP	X
Guest	Donald	Martin	G&W Electric Co.	X
Guest	Jeff	Mizener	Siemens Industry, Inc.	X
Guest	Roberto	Olivares	Siemens	X
Guest	Al	Pruitt	The Durham Company	X
Guest	Caryn	Riley	Georgia Tech/NEETRAC	X
Guest	Mark	Roberson	AZZ/Calvert	X
Guest	Erin	Spiewak	IEEE	X
Guest	John	Webb	ABB	X
Guest	Michael	Whitney	S&C Electric Company	X

Annex 2: Powerpoint

(Following)

C37.68 Distribution Controls for Switchgear

Working Group Meeting
October 2018
Kansas City

Paul Found (chair),
Karla Trost (vice-chair)

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 essentiality 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.**

For more details, see *IEEE-SA Standards Board Operations Manual*, clause 5.3.10 and *Antitrust and Competition Policy: What You Need to Know* at http://standards.ieee.org/develop/policies/antitrust.pdf

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)
- *IEEE-SA Standards Board Operations Manual*
  (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.

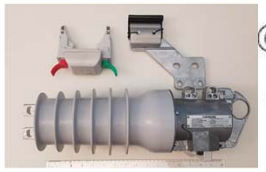
RECOMMENDATION: C37.68 will send PAR & drafts to PSRC for review (to share with participants – ask for potential conflicts as we develop our draft.

Action Item:

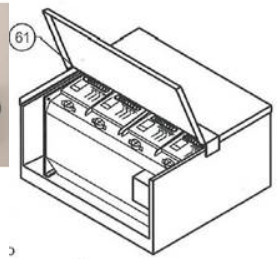
Definition of Control

What is a control?

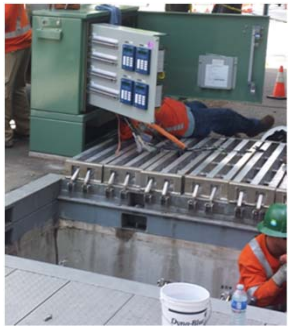
Pole Mounted



Pad Mounted



Wet/Dry Vaults



Action Item:

Definition of Control

"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."

Action Item:

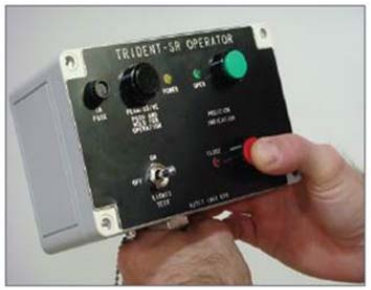
Definition of Control

What equipment is covered by PAR Scope?

PAR Scope:

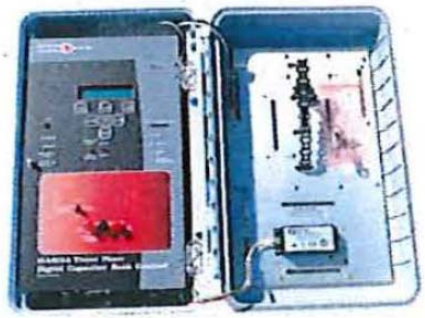
- This standard applies to microprocessor-based devices employed in distribution switchgear typically mounted on power poles, in wet or dry vaults, or in pad mounted switchgear enclosures.
- This standard does not apply to microprocessor-based devices employed in high voltage circuit breakers or metal-enclosed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

Portable Motor Actuator



Hand Held Pendant Cntrl


Voltage Regulator


Capacitor Control


Recloser


Switchgear

IEEE PES Power & Energy Society®

IEEE

Action Item:

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

		F18 Meeting	Post-S2018 Meeting									Post-F2017		
			Pole Mounted		Pad Mounted			Wet/Dry Vaults			Comment May 2018	Include	Exclude	Annex Consolidated comments
			Separate from primary	Integrated to primary (Part of th	Inside primary encl. (V	Outside, on primary encl. (LV	Outside, off of primary (pedesta	Inside primary encl.	Outside, on primary encl.	Outside, off of primary (pedesta				
2	Environmental factors										(3)**Primary encl. in wet vault uncommon. (6) General comment: As indicated below, I believe most requirements will have some relevance to all applications. However, the requirements will vary by application environment. The WG may benefit by focusing only on pole-mounted applications to start, then pulling in padmount and vault applications by exception afterward.			
2.1	Introduction		1	1	1	1	1		1	1				
2.2	Environmental factors impacting the enclosure		1, 5, 6	1, 5	1, 5, 6	1, 3, 5, 6	1, 3, 5, 6	5, 6	1, 3, 5, 6	1, 3, 5, 6	(6) In most cases, padmount outside enclosure will be similar to polemount. Many requirements will not apply to integrated controls.	x		These discussed & agreed on the webex.
2.2.1	Heat and cold		1, 2, 3, 4, 5, 6, 7	1, 2, 3, 4, 5, 7	2, 3, 4, 5, 6,	2, 3, 4, 5, 6,	2, 3, 4, 5, 6,	2, 4, 5, 6, 7	2, 3, 4, 5, 6,	2, 3, 4, 5, 6,	(3)i.e. temperature spec. +/- 40 C etc.			
2.2.2	Radiation (solar, heat)		1, 2, 3, 4, 5, 6, 7	1, 2, 3, 4, 5	1, 2, 4, 5	2, 3, 4, 5, 6,	2, 3, 4, 5, 6,	2	1, 2, 3	1, 2, 3, 5, 6, 7				
2.2.3	Water and humidity		1, 2, 3, 4, 5, 6, 7	1, 3, 5, 7	1, 4, 6	1, 3, 4, 5, 6, 7	1, 3, 4, 5, 6, 7	4, 6	1, 3, 4, 5, 6, 7	1, 3, 4, 5, 6, 7	(2)C37.75			
2.2.4	Atmosphere, incl. pollutants		1, 2, 3, 4, 5, 6, 7	1, 3, 5, 7	1, 3, 5, 6	1, 3, 5, 6, 7	1, 3, 5, 6, 7	4, 6	1, 3, 4, 6, 7	1, 3, 4, 5, 6, 7	(2)C37.75. (5) are there any controls that are located in the sealed primary compartment? I doubt there are.			
2.2.5	Mechanically active substances (sand, dust)		1, 2, 3, 4, 5, 6, 7	1, 3, 5, 7	1, 5, 6	1, 3, 5, 6, 7	1, 3, 4, 5, 6, 7	6	1, 3, 7	1, 3, 5, 6, 7	(2)C37.75			
2.2.6	Contaminating materials (fluids)		1, 3, 5, 6	1, 3	1, 3, 6	1, 3, 6	1, 3, 6	4, 6	1, 3, 4, 6, 7	1, 3, 4, 6	(2)C37.75, (3)Padmount encl. not water tight. (5) including control cable interfaces.			
2.2.7	Animals		1, 2, 3, 4, 5, 6, 7	1, 3, 4, 7	1, 3, 5, 6, 7	1, 3, 5, 6, 7	1, 3, 5, 6, 7	6	1, 3, 4, 5, 6, 7	1, 3, 4, 5, 6, 7	(2)C37.75			
2.2.8	Accessibility		1, 2, 3, 4, 5, 6, 7	1, 3	1, 3, 6, 7	1, 3, 5, 6, 7	1, 3, 5, 6, 7	6	1, 3, 7	1, 3, 5, 6, 7	(2)C37.75			
2.2.9	Plants		1, 3, 4, 6	1, 3	1, 6	1, 5, 6	1, 5, 6	6	1	1, 5, 6	(2)C37.75, (3) Tree Contact			
2.2.10	Mechanical conditions (vibration, drop, impact, static load)	Tim notes duplication. Defer to Chapter 3 coverage.	1, 2, 3, 4, 5, 6, 7	1, 2, 3, 4, 5, 7	1, 2, 3, 5, 6, 7	1, 2, 3, 5, 6, 7	1, 2, 3, 5, 6, 7	2, 4, 5, 6, 7	2, 3, 4, 5, 6,	2, 3, 4, 5, 6, 7				
2.3	Environmental factors for the electronics inside the enclosure		1, 3, 5, 6	1, 3, 5	1, 3, 5, 6	1, 3, 5, 6	1, 3, 5, 6	6	1, 3, 5, 6	1, 3, 5, 6		x		These discussed & agreed on the webex.

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:

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

Electrical Surges/Transients

Recommended:

Topic	Standard	Recommendation
Emission - RF	EN 55011	Class A, Group 1
Emission – 9k-400GHz	EN 55032	Class A
Radiated RF Immunity	C37.90.2	35V/m Severity

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:

Topic	Standard	Recommendation
Dielectric; Impulse	C37.90	Clause 8

Sensor/Apparatus Interface

Recommended:

Topic	Standard	Recommendation
EMI/EMC	C37.90.2	Follow the standard
EMC Ring Waves	IEC 61000-4-12	Must: Level 3 (1kV L/L) Should: Level 4 (2kV L/L)

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:

Topic	Standard	Recommendation
Voltage input ranges	C37.100.1	Table 5
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

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

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.

61000-4-11

Table 1 – Preferred test level and durations for voltage dips

Class[a]	Test level and durations for voltage dips (t_s) (50 Hz/60 Hz)				
Class 1	Case-by-case according to the equipment requirements				
Class 2	0 % during ½ cycle	0 % during 1 cycle	70 % during 25/30[c] cycles		
Class 3	0 % during ½ cycle	0 % during 1 cycle	40 % during 10/12[c] cycles	70 % during 25/30[c] cycles	80 % during 250/300[c] cycles
Class X[b]	X	X	X	X	X

[a] Classes as per IEC 61000-2-4; see Annex B.

[b] 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.

[c] "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

Class[a]	Test level and durations for short interruptions (t_s) (50 Hz/60 Hz)
Class 1	Case-by-case according to the equipment requirements
Class 2	0 % during 250/300[c] cycles
Class 3	0 % during 250/300[c] cycles
Class X[b]	X

[a] Classes as per IEC 61000-2-4; see Annex B.

[b] 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.

[c] "250/300 cycles" means "250 cycles for 50 Hz test" and "300 cycles for 60 Hz test".

Item to Discuss with the group-

Allowable response?

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.*

Action Item:

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.

Action Item:

Test Requirements: Section 6

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

Damp Heat Cycling IEC 60068-2-30-2005, 25C – 55C, 6 cycles 95% humidity

Action Item:

Test Requirements: Section 6

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:

Clause X.0	X.1 Application	X.2 Design	X.3 Testing
eg. Environmental			
	eg. Condensation	Shall be designed to mitigate	IEC 60068-2-38 – 2009 Enviro Testing Hi Temp/ Humidity, Cold

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.