

**SWITCHGEAR ASSEMBLIES SUBCOMMITTEE  
MINUTES OF THE SPRING 2015 MEETING**

**TradeWinds Hotel, St. Pete Beach, FL USA  
April 29, 2015**

The meeting was called to order by SA S/C Chair, D. Edwards, at 1:30 PM on April 29, 2015 with the introduction of the following members and guests:

**Attendance**

Members: 32 present, 8 absent – Quorum was met.

Guests: 36

Total: 68

Attendance is recorded at the end of the meeting minutes. Membership and attendance is recorded in the AMS system.

**1. Introduction of Members and Guests**

Members and guests introduced as recorded above.

**2. Approval of Meeting Agenda**

Spring 2015 agenda presented.

A motion to approve was made by T. Burse, 2<sup>nd</sup> by C. Schneider and was approved.

**3. Approval of SA Meeting Minutes**

Link: <http://www.ewh.ieee.org/soc/pes/switchgear/minutes/2014-1/F14index.htm>

Minutes (link above) from the fall 2014 meeting in Asheville, NC were presented.

A motion to approve was made by A. Morse, 2<sup>nd</sup> by M. Wactor and was approved.

A proposal by D. Edwards to have future SA S/C meeting minutes and SA working groups meeting minutes automatically approved after receiving no feedback 60 days after posting said minutes to the PES Switchgear website. This proposal will be topic brought to the ADSCOM meeting.

In the ADSCOM meeting on April 30<sup>th</sup>, subsequent to the SA S/C meeting, minutes are accepted after being posted to the PES Switchgear website. Contact the SA S/C Secretary with any corrections.

SA S/C Secretary Email address: [mike.lafond@ieee.org](mailto:mike.lafond@ieee.org)

**4. Working Group Status Reports**

**a. C37.20.1 – Standard for Metal-Enclosed Low-Voltage Power Circuit Breaker Switchgear**

T. Burse: No WG meetings held.

C37.20.1 was board approved on March 26, 2015. It is currently in editorial review which is due to complete on May 25, 2015 and publishing on or before July 2, 2015. Sincere thanks to WG effort. WG Chair requests to disband the WG, 2<sup>nd</sup>: F. Mayle and approved.

Actions for SA S/C: Chair will report WG disbanding.

**b. C37.20.2 – Standard for Metal-Clad Switchgear**

M. Wactor: No WG meeting held.

Ballot successfully closed. Document is targeted for RevCom review in June 2015 and should then enter editorial review shortly thereafter. WG Chair expects to request a disbanding of the WG at the fall meeting.

Actions for SA S/C: Chair will report potential WG disbanding.

**c. C37.20.6 – 4.76 kV to 38 kV Rated Grounding and Testing Devices Used in Enclosures**

T. Olsen: No WG meeting held.

Document was published last week. WG Chair requests a disbanding of the WG, 2<sup>nd</sup>: T. Burse and approved.

Actions for SA S/C: Chair will report WG disbanding.

**d. C37.20.7 – Guide for Testing Medium-Voltage Metal-Enclosed Switchgear for Internal Arcing Faults**

M. Wactor: Minutes are provided.

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WG meeting met on April 28, 2015 with 29 of 31 members and 53 guests in attendance. WG reviewed draft 8 and comments received to date. Two new groups (C37.20.9 WG and Variable Speed Drives group) are each working on proposed text to possibly include within the scope of the C37.20.7 document. The proposed text is due to the WG Chair by June 30<sup>th</sup> for consideration. The WG will decide to include or exclude the proposals prior to the fall meeting. If WG accepts to include then a PAR revision will be required. WG will target a final draft ballot for the fall meeting and WG may require a PAR extension.

Actions for SA S/C: No further action required.

**e. C37.20.9 – Metal Enclosed Switchgear Rated 1 kV to 52 kV Incorporating Gas Insulation Systems**

E.R. Byron: Minutes are provided.

WG meeting met April 29, 2015 with 53 attendees and focused on draft 1A which included an increase in temperature limits of SF6 gas to align with 100.1. There are several challenges to resolve that will require coordination with external groups. The RODE S/C has a document on solid dielectric that will require an approval prior to sharing with this WG and may need a discussion at ADSCOM meeting. There have been some discussions with the C37.20.10 WG Chair to better understand which definitions are to be included in that WG scope and which definitions should remain in the mother document. The C37.20.9 WG Chair does express a desire that all definitions for the SA S/C documents should be included within a common document such as C37.20.10. The WG is working on text to propose to C37.20.7 WG to consider for inclusion and should be completed by June 30, 2015.

The RODE S/C Chair via email on April 29<sup>th</sup> shared the solid dielectric TF report to the C37.20.9 WG and thus no further action required.

Actions for SA S/C: No further action required.

**f. C37.20.10 – Standard for Definitions for AC (52kV and below) and DC (3,2kV and below) Switchgear Assemblies**

K. Flowers: Minutes are provided.

WG meeting met on Monday.

WG met on Monday. PAR was approved on Feb. 16, 2015. WG proceeded to first round of balloting which closed on April 22, 2015. Ballot generated 168 comments that must be satisfied and some additional 17 rogue comments. Topics were reviewed and WG driving toward a resolution path but work is not completed. The WG Chair direction for this scope was to address potential homeless definitions that do not reside within a mother document under SA S/C responsibilities and not all definitions within SA S/C documents. The WG Chair requests the SA S/C body for direction.

D. Edwards: The past discussion was focused on the definitions that were at risk of being abandoned or lost from not being automatically added to the IEEE on-line dictionary. Future efforts can expand upon this work for a potential all-encompassing SA S/C document. Motion from past meeting minutes was broadly defined to allow the WG to decide how to best proceed with the current problem of losing definitions.

T. Olsen: There are several documents that are just published or about to be published and these documents contain definitions. Expanding the scope of C37.20.10 WG to include all definitions will create duplicate definitions in the IEEE on-line dictionary and possibly create conflicting definitions during the balloting process of C37.20.10. My recommendation is to maintain the current course with the C37.20.10 WG to focus on the SA S/C definitions that do not reside in a mother document.

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K. Flowers: To date in our efforts have only discovered a few conflicting definitions identified to date from recently published documents. The C37.20.10 WG body prefers to focus on the orphaned definitions and not expand this effort to all SA S/C definitions.

B. Eldridge: Will there be a concern in a user having to find multiple documents for definitions relevant to one standard?

T. Olsen: The IEEE on-line dictionary will contain all definitions from all documents that contain a definition and will let the user know which document that definition is defined therein. This will be the common mechanism to easily find definitions for the SA S/C documents.

P. Barnhart: Agree with the C37.20.10 WG approach and each WG should review C37.20.10 document for any new definition effort to minimize any future potential conflicting definitions.

SA S/C Chair: Consensus confirmed within the SA body. C37.20.10 WG should proceed as best as possible to maintain current scope leaving existing definitions in their mother document and include in C37.20.10 drafts SA S/C definitions that are not in a published SA S/C document.

Actions for SA S/C: No further action required.

**g. C37.21 – Control Switchboards**

D. Edwards: This document needs a WG Chair.

This WG can leverage work from C37.20.1 and 20.2 documents. This document covers relays and controls in a switchboard cabinet and will expire in 2018. I do not expect this WG effort to be difficult to update. I am looking for volunteers for the WG Chair. D. Hrnrcir volunteers to be the C37.21 WG Chair. The following individuals offer to participate in this effort M. Lafond, D. Edwards, A. Patel, C. Taylor, T. Olsen, J. Mizener, A. Rowell, and C. Schneider.

Actions for SA S/C: Chair will report the formation of a WG.

**h. C37.23 – Standard for Metal-Enclosed Bus**

T. Hawkins: Minutes are provided.

WG meetings held today. WG past efforts included several teleconferences. Drafts have been circulated and balloted on March 3, 2015. WG has received 303 comments with approximately 176 technical in nature. WG focused on resolving comments. WG is targeting a recirculation prior to the fall meeting for a second round of comments.

SA S/C Chair: My compliments to running five teleconferences conferences between regular meetings with good participation. WG demonstrated excellent use of time management. Question is there any minutes from these teleconferences?

T. Burse: minutes from teleconferences are not required reporting as the focus of this work is captured in the resolution of the comments from the balloting process.

A. Jur: We have a straw man position on most comments but are estimating only 5% done.

Actions for SA S/C: No further action required.

**i. C37.24 – Guide for Evaluating the Effect of Solar Radiation on Outdoor Metal-Enclosed Switchgear**

L. Farr: Minutes are provided.

TF Chair is not present.

D. Edwards: WG meeting hold on Monday. WG has a first draft document and TF Chair will submit to the WG a draft PAR for review.

Actions for SA S/C: Chair to report PAR activity.

**j. C37.81 – Seismic Qualification of Class 1E Metal-Enclosed Power Switchgear Assemblies**

D. Riffe: Minutes provided.

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Note that a combined WG is focused on both C37.81 and C37.82 documents.

Riffe: WG meeting held on Tuesday with 12 members. Both documents are at draft 2. WG has received minor comments and estimate next draft within 30 days. C37.20.10 discussions on definitions may impact to this document and WG trying to resolve on-line multiple definitions. PAR expires in 2018. Progress to date is good and most work editorial in nature. Input from substation seismic experts some utility input was received to date. No resolution in site for IEEE/IEC joint effort so no significant impact anticipated in our effort.

Actions for SA S/C: No further action required.

**k. C37.82 – Qualifications of Switchgear Assemblies for Class 1E Applications in Nuclear Power Generating Stations**

D. Riffe: Minutes Provided

Riffe: WG meeting held on Tuesday with 12 members. Both documents are at draft 2. WG has received minor comments and estimate next draft within 30 days. C37.20.10 discussions on definitions may impact to this document and WG trying to resolve on-line multiple definitions. PAR expires in 2018. Progress to date is good and most work editorial in nature. Input from substation seismic experts some utility input was received to date. No resolution in site for IEEE/IEC joint effort so no significant impact anticipated in our effort.

Actions for SA S/C: No further action required.

**5. Old Business**

**a. IEC Activities**

T. Burse: Meeting minutes provided.

Meeting held in Tokyo in December. All work is done. New effort won't start until 2017. Not much to report until 2017.

**b. ASC C37 – General Update**

T. Olsen: Meeting minutes provided.

Several documents are pending and currently in the balloting process. New operating procedures are being established. Documents continue to be available as free downloads.

**c. Senior Membership – Status**

D. Edwards: Last meeting we encouraged individuals to try for senior membership.

From our last meeting we have had the following members achieve senior membership status (D. Hrncir, T. Hawkins, H. Josten, and S. Gohil). It takes about 30 minutes to apply for senior membership and 3 references from a current senior member. Currently there is not an easy way to search in the AMS tool to identify who is a senior member.

T. Burse: At PCIC, membership and level is identified which helps individuals find a sponsor or reference.

P. Sullivan: Having a list of senior members from IEEE would help the committee in this effort.

**d. Switchgear Assemblies Committee Membership – General Update**

D. Edwards: there are several criteria to obtain membership some of which is attending four of the last six meetings, contributed to WG effort and some other criteria.

We have a list of names for membership to our group and if interested, please contact SA S/C WG Chair or Secretary for membership.

**e. Main Committee Membership Recommendations – General Update**

T. Olsen: New members will be announced at the end of tomorrow's main committee meeting. Main committee membership will be updated immediately after the spring meeting which aligns with typical IEEE renewal.

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D. Edwards: there are several criteria considered for main committee membership which includes being a member of PES, SA membership, attendance in four of the last six main committee meetings and a recommendation from the SA S/C.

P. Sullivan: The chair of the main committee can override those submitted for main committee membership.

Subsequent to the SA S/C meeting on April 29<sup>th</sup>, the following SA S/C members were confirmed as main committee members.

T. Hawkins, D. Hrcir, A. Jivanani, A. Jur, M. Lafond, D. Moser, C. Schneider, and C. Tailor

**6. New Business**

**a. Manual Releases and Indicators – Colors and Words/Symbols**

D. Edwards: Copy of presentation is attached to the meeting minutes.

SA S/C Chair: Third party certification is a potential conflict when a customer desires different colors than what is required by the standard.

P. Barnhart: Recommends use of standardized colors. The UL label indicates that when shipped, the equipment met the requirements of the applicable standards.

If the colors are changed in the field, the UL label stays on the product to state the product left the factory was compliant with regulatory requirements.

P. Barnhart: If there product is modified in the field, it is up to the person modifying has responsibilities for the modification.

Olsen: Many of the SA S/C documents address the indicating light colors and not the buttons like LVSD S/C.

SA S/C Chair: RODES, LVSD, and HVCB S/C's have been provided the same presentation and requested to provide input during the upcoming ADSCOM S/C meeting.

**b. SA Document Status – Required action – review of proposed “SA Document Status” report.**

M. Lafond: will be updated. WG chairs to confirm accurate statements and sessions required for next session.

**c. WG Meeting Room Requests – Update “SA Document Status” report**

M. Lafond: Please contact me for any changes for meeting room requirements. Meeting room requests are circulated in SA Document status.

**d. ADSCOM – Items for SA Chair to discuss at ADSCOM meeting**

PAR Activity: C37.24 TF, C37.21 WG forming

Senior Member Roster: Inquire on methods to generate a list.

Manual Releases and Indicators: Share with ADSCOM membership

**e. Main Committee Meeting Items – Review items to be presented**

Total: 14

Future PAR Activity: 2 (C37.24 TF, C37.21 WG Forming)

Active PAR's: 7 (C37.20.2, C37.20.7, C37.20.9, C37.20.10, C37.23, C37.81, C37.82)

Disbanding WG's: 2 (C37.20.1, C37.20.6)

Not Active: 3 (C37.20.3, C37.20.4, C37.121)

**f. Working Group Minutes – To Subcommittee Secretary no later than April 30, 2015.**

Email address: [mike.lafond@ieee.org](mailto:mike.lafond@ieee.org)

**g. WG - Booklet & Website Synopsis – To Subcommittee Secretary no later than April 30, 2015.**

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Email address: [mike.lafond@ieee.org](mailto:mike.lafond@ieee.org)

**h. Upcoming Meetings**

Fall 2015 (20 Sep – 24 Sep), Cataraman Resort Hotel, San Diego, CA USA  
Spring 2016 (25 Apr – 28 Apr), Sonesta Resorts, Hilton Head Island, SC USA  
Fall 2016 ((Date TBD), Pittsburgh, PA

**7. Adjourn**

Motion by A. Morse to adjourn the meeting, 2<sup>nd</sup>: H. Josten.

Motion approved.

Meeting adjourned at 2:56pm.

Reported by:

Michael P. Lafond  
Switchgear Assemblies Sub-Committee Secretary  
April 29, 2015

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Attendance record and as recorded in the AMS system:

<b>Role</b>	<b>First Name</b>	<b>Last Name</b>	<b>Company</b>
Chair	Doug	Edwards	Siemens Industry, Inc.
Secretary	Michael	Lafond	General Electric
Member	Charles	Ball	S&C Electric Company
Member	Paul	Barnhart	Underwriters Laboratories
Member	Jerry	Baskin	Federal Pacific
Member	Ted	Burse	Powell Industries, Inc
Member	Eldridge	Byron	Schneider Electric
Member	David	Dunne	Schneider Electric
Member	Jerry	Earl	ABB - Retired
Member	Michael	Flack	Southern Company Generation
Member	Keith	Flowers	Siemens Industry, Inc.
Member	Sahadev	Gohil	AZZ/Central Electric Mfg. Co.
Member	Tom	Hawkins	Siemens Industry, Inc.
Member	Dan	Hrncir	Eaton
Member	Harry	Josten	Siemens Energy & Automation
Member	Art	Jur	Eaton Corporation
Member	David	Lemmerman	PECO/Exelon
Member	Alex	Lizardo	ABB
Member	Frank	Mayle	Technibus, Inc.
Member	Deepak	Mazumdar	Central Electric Manufacturing Co.
Member	Charles	Morse	Morse Ventures, Inc.
Member	Darryl	Moser	ABB
Member	Ted	Olsen	Siemens Industry, Inc.
Member	Miklos	Orosz	Schneider Electric
Member	Amit	Patel	GE
Member	Dave	Riffe	Westinghouse Electric Company
Member	Carl	Schneider	Schneider Electric
Member	John	Shullaw	GE Energy Management - Industrial Solutions
Member	Dean	Sigmon	Eaton Corporation
Member	Paul	Sullivan	DuPont
Member	Chand	Taylor	Eaton Corporation
Member	Michael	Wactor	Powell Industries, Inc
Guest	Andres	Aviles <sup>(1)</sup>	CE Power
Guest	David	Beseda	S&C Electric Co.
Guest	Jean-Marc	Biasse	Schneider Electric
Guest	Thomas	Blair	Tampa Electric Company
Guest	Russell	Boyce	Eaton
Guest	Clint	Carne	Schneider Electric

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<b>Role</b>	<b>First Name</b>	<b>Last Name</b>	<b>Company</b>
Guest	Stephen	Cary	GE Energy Management
Guest	Daniel	Delfino	General Electric
Guest	Donald	Elliott	ABB
Guest	Sergio	Flores	Schneider Electric Inc. USA
Guest	Paul	Gingrich	AZZ / Central Electric
Guest	Peter	Glaesman	Reuel, Inc.
Guest	Anne	Good	Netshape Technologies, Inc.
Guest	Lou	Grahor	Eaton Corporation
Guest	Bruce	Hack	Crown Electric Engineering & Manufacturing
Guest	Ronald	Hartzel	Eaton Corporation
Guest	David	Jackson	ABB
Guest	Jose	Jarque	AZZ Switchgear Systems
Guest	Jayamali	Kasige	Crown Technical Systems
Guest	Chad	Kennedy	Schneider Electric
Guest	John	McClelland	Technibus
Guest	Jeffery	Mizener	Siemens Industry
Guest	Owen	Parks	ABB
Guest	Andrew	Peterson	ABB
Guest	Samala Santosh	Reddy	Powell Industries
Guest	Julian	Rizo	Xcel Energy
Guest	Richard	Rohr	Powell Electrical Systems
Guest	Amy	Rowell	Eaton
Guest	Todd	Sauve	Rockwell Automation
Guest	Robert	Sazanowicz	The United Illuminating Company
Guest	Joseph	Smith	FortisAlberta
Guest	Hongbiao	Song	GE
Guest	Erin	Spiewak	IEEE
Guest	James	Stacy	Schneider Electric
Guest	Matthew	Williford	Schneider Electric
Guest	Terry	Woodyard	Siemens Industry Inc.

(1) Guest's name was not registered within the AMS system and therefore attendance only recorded here within meeting minutes.



## 2015 IEEE – PES St. Pete Beach, FL

**Issue:** Current C37.13 ballot has comments requesting changes associated with text concerning color and wording for:

- Manual Releases
- Contact Position Indication
- Stored Energy Indicator

**Request:** ADSCOM to:

- Develop plan for having various standards have similar text.
- Consensus so that C37.13 can resolve negative ballots.

**Goal:** Common text, certainly common concepts for Colors and Labeling between various standards.

- Decision for text so that C37.13 can resolve negative ballots.
- Recommendation or motion to address text in various IEEE-PES documents.

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## Associated Standards of Interest

C37.13-D11.3	Low-Voltage AC Power CB's
C37.13.1-2006	Definite Purpose Switching Devices .... Low-Voltage
C37.14-2014	Low-Voltage DC Power CB's
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C37.04-1999	AC High-Voltage CB's
C37.20.4-2013	Indoor AC Switches (1 kV to 38 kV) for Use in Metal-Enclosed Swgr
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C37.20.1-2006	Metal-Enclosed Low-Voltage Power Circuit Breaker Switchgear
C37.20.2-1999	Metal-Clad Switchgear
C37.20.3-2013	Metal-Enclosed Switchgear
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IEC 60947-1 2004	Low-voltage switchgear and controlgear: Part 1 General rules

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Standard	Color	Words
<b>C37.13-D11.3</b> (with suggested changes) LV AC PCB	Red background ... with contrasting letters Green or black background ... with contrasting letters	“Open” or “Trip” “Close” As an alternative ... a symbol may be provided in accordance with IEC 60947-1.
<b>C37.13.1-2006</b> - LV DPS	No text	No text
<b>C37.14-2014</b> - LV DC PCB	Red background ... with contrasting letters Green or black background ... with contrasting letters	“OPEN” “CLOSE” As an alternative ... a symbol may be provided in accordance with IEC 60947-1.
<b>C37.20.4-2013</b> - AC Switches Used in ME Swgr	No text	No text
<b>C37.04-1999</b> - HVCB	Red background with ... contrasting letters Green background with ... contrasting letters	“open” and/or “trip” “close”
<b>C37.20.1</b> - LV Swgr	No text	No text
<b>C37.20.2-1999</b> – MC Swgr	No text	No text
<b>C37.20.3-2013</b> – ME Swgr	No text	No text

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Manual Releases

Standard	Color	Words
<b>C37.13-D11.3</b> (with suggested changes) LV AC PCB	Red background with ... contrasting letters Green background with...contrasting letters	“Closed” or “On” “Open” or “Off” As an alternative ... a symbol may be used in accordance with IEC 60947-1.
<b>C37.13.1-2006</b> - LV Definite Switching Devices	Red background with ... white or aluminum lettering Green background with ... white or aluminum lettering	CLOSED or ON OPEN or OFF
<b>C37.14-2014</b> - LV DC PCB	Red background ... with contrasting letters Green background ... with contrasting letters	“CLOSED” “OPEN” As an alternative ... a symbol may be provided in accordance with IEC 60947-1.
<b>C37.20.4-2013</b> - AC Switches Used in ME Swgr	Red background with ... contrasting letters Green background with...contrasting letters	CLOSED OPEN
<b>C37.04-1999</b> - HVCB	Red background with ... contrasting letters Green background with...contrasting letters	“closed” “open”
<b>C37.20.1</b> - LV Swgr	No text	No text
<b>C37.20.2-1999</b> - MC Swgr	Unless otherwise specified ... closed position indicated by a red light open position indicated by a green light	No text
<b>C37.20.3-2013</b> - ME Swgr	Unless otherwise specified ... closed position indicated by a red light open position indicated by a green light	No text

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Contact Position Indicator

Standard	Color	Word
<b>C37.13-D11 .3</b> (with suggested changes) LV AC PCB	Yellow background with black lettering ... White background with black lettering ...	... to indicate mechanism is charged. ... to indicate mechanism is discharged.
<b>C37.13.1-2006</b> - LV Definite Switching Devices	Yellow background with black lettering ... White background with black lettering ...	... to indicate ... mechanism is charged. ... to indicate ... mechanism is discharged.
<b>C37.14-2014</b> - LV DC PCB	Yellow background with black lettering ... White background with black lettering ...	... to indicate "CHARGED" mechanism ... to indicate "DISCHARGED" mechanism
<b>C37.20.4-2013</b> - AC Switches Used in ME Swgr	No text	No text
<b>C37.04-1999</b> - HV CB's	Yellow background with black lettering ... White background with black lettering ...	... to indicate ... mechanism is charged. ... to indicate ... mechanism is discharged
<b>C37.20.1</b> - LV Swgr	No text	No text
<b>C37.20.2-1999</b> Metal-Clad Swgr	No text	No text
<b>C37.20.3-2013</b> – ME Swgr	No text	No text

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### Recommendation / Potential Motion

Update IEEE PES documents with text associated with colors and various wording including use of symbols for the:

- Manual Releases
- Contact Position Indicators
- Stored Energy Indicators

The text shall be updated to match C37.13-D11.3 (included in these slides).

### Excerpts from Various Standards – For Easy Reference

C37.13-D11.3	Low-Voltage AC Power Circuit Breakers
C37.13.1-2006	Definite Purpose Switching Devices .... Low-Voltage
C37.14-2014	DC Power Circuit Breakers
C37.20.1-2006	Metal-Enclosed Low-Voltage Power Circuit Breaker Swgr
C37.20.2-1999	Metal-Clad Switchgear
C37.20.3-2013	Metal-Enclosed Switchgear
C37.20.4 -2013	Indoor AC Switches (1 kV to 38 kV) for Use in Metal-Enclosed Swgr
C37.04-1999	AC High-Voltage Circuit Breakers
IEC 60947-1 2004	Low-voltage switchgear and controlgear – Part 1: General rules

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## Low-Voltage Switching Devices S/C

### C37.13 – D11.3 Low-Voltage AC Power Circuit Breakers

#### 6.3 Manual releases

Manual releases to open and close the circuit breaker shall be provided as detailed in Table 5. If provided, they shall be labeled clearly so that a local operator can easily read and operate them.

Manual release devices shall be marked either on the device or labeled separately as follows:

- Red background with the word "Open" or "Trip" in contrasting letters to indicate that the release opens the circuit breaker; and
- Green or black background with the word "Close" in contrasting letters to indicate that the release closes the circuit breaker.

As an alternative to the required manual release indicator word, a symbol may be used in accordance with IEC 60947-1.

#### 6.4 Contact position indicator

A reliable mechanical contact position indicator, which can easily be read by the local operator without opening the enclosure door on the indoor equipment construction, shall be supplied.

- Red background with the word "Closed" or "On" in contrasting letters to indicate closed contacts
- Green background with the word "Open" or "Off" in contrasting letters to indicate open contacts

As an alternative to the required mechanical contact position indicator word, a symbol may be used in accordance with IEC 60947-1.

#### 6.5 Stored energy indicator

A stored energy indicator, which can easily be read by the local operator without opening the enclosure door on the indoor equipment construction, shall be supplied. A reliable indicator with the following colors shall be used:

- Yellow background with black lettering to indicate mechanism is charged.
- White background with black lettering to indicate mechanism is discharged.

As an alternative to the required stored energy indicator word, a symbol may be used which indicates when the storing mechanism is fully charged and discharged .

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## Low-Voltage Switching Devices S/C

### C37.13.1-2006 Definite Purpose Switching Devices .... Low-Voltage

#### 6.2 Contact position indicator

A mechanical contact position indicator that can be easily read by a local operator shall be provided. The indicator shall show the words ON/OFF or CLOSED/OPEN. The following colors shall be used:

- a) Red background with the word CLOSED or ON in white or aluminum (contrasting) letters to indicate closed contacts;
- b) Green background with the word OPEN or OFF in white or aluminum (contrasting) letters to indicate open contacts.

#### 6.3 Stored-energy indicator (for stored-energy-type closing mechanisms only)

A stored-energy indicator is required only when the mechanism can be left in the charged condition. The indicator, if required, shall be a mechanical indicator that is visible with the door closed. The indicator shall show the words CHARGED/DISCHARGED.

The following colors shall be used:

- a) Yellow background with black lettering to indicate that the closing mechanism is charged
- b) White background with black lettering to indicate that the closing mechanism is discharged

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## Low-Voltage S/C: C37.14-2014 DC Power Circuit Breakers

### 7.3 Contact position indicator

A reliable mechanical contact position indicator, which can easily be read by the local operator, shall be supplied. The following colors shall be used:

- a) Red background with the word "CLOSED" in contrasting letters to indicate closed contacts; and
- b) Green background with the word "OPEN" in contrasting letters to indicate open contacts.

In addition to the required mechanical contact position indicator word, a symbol may also be provided in accordance with IEC 60417.

### 7.4 Mechanical manual open and close buttons

Reliable mechanical manual open and close buttons, which can easily be accessed by the local operator, shall be supplied for circuit breakers with stored energy mechanisms. The following colors shall be used:

- a) The close button shall have a green or black background with the word "CLOSE" in contrasting letters.
- b) The open button shall have a red background with the word "OPEN" in contrasting letters.

In addition to the required mechanical close or open function descriptive word, a symbol may also be provided in accordance with IEC 60417.

### 7.5 Stored-energy indicator

When stored-energy operating mechanisms are utilized, a stored-energy indicator that can easily be read by the local operator shall be supplied. A reliable indicator with the following colors shall be used:

- a) Yellow background with black lettering to indicate "CHARGED" mechanism; and
- b) White background with black lettering to indicate "DISCHARGED" mechanism.

In addition to the required stored-energy indicator word, a symbol may also be provided in accordance with IEC 60417.

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## Switchgear Assemblies S/C

### C37.20.1-2006 Metal-Enclosed Low-Voltage Power Circuit Breaker Swgr

No text

### C37.20.2-1999 Metal-Clad Switchgear

#### 7.19 Circuit breaker open/close position indication

Indicating lights shall be provided to indicate the open and closed positions of the circuit breaker. Unless otherwise specified, the closed position shall be indicated by a red light and the open position by a green light.

### C37.20.3-2013 Metal-Enclosed Switchgear

#### 7.11 Circuit breaker open/close position indication

Indicating lights shall be provided to indicate the open and closed positions of the circuit breaker and shall be externally viewable locally. **Unless otherwise specified, the closed position shall be indicated by a red light and the open position by a green light.**

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## Switchgear Assemblies S/C

### C37.20.4 -2013 Indoor AC Switches (1 kV to 38 kV) for Use in Metal-Enclosed Swgr

#### 7.12 Position indication

Subclause 5.12 of IEEE Std C37.100.1-2007 does not apply.

Indication shall be provided of the position of the contacts of the main circuit.

The following colors and text shall be used to indicate contact position:

- a) **Red background with the word CLOSED** in contrasting letters to indicate closed contacts
- b) **Green background with the word OPEN** in contrasting letters to indicate open contacts

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## High-Voltage Circuit Breakers S/C

### C37.04-1999 AC High-Voltage Circuit Breakers

#### 6.7.1 Contact position indicator

A reliable mechanical contact position indicator, which can easily be read by the local operator, shall be supplied. The following colors shall be used:

- a) Red background with the word "closed" in contrasting letters to indicate closed contacts; and
- b) Green background with the word "open" in contrasting letters to indicate open contacts.

#### 6.7.5 Stored energy indicator

A stored energy indicator that can easily be read by the local operator shall be supplied. For stored energy systems using compressed gas, a pressure gauge shall be supplied. For stored energy systems using springs, a reliable indicator with the following colors shall be provided:

- a) Yellow background with black lettering to indicate "charged" mechanism; and
- b) White background with black lettering to indicate "discharged" mechanism.

#### 6.7.6 Manual releases

Indoor circuit breaker mechanisms shall have a manual release to OPEN the circuit breaker, and a manual release to CLOSE the circuit breaker. They shall be labeled clearly so that a local operator can easily read and operate them. Manual releases for outdoor circuit breaker mechanisms, if provided, shall meet the same requirements described in 6.7.5.

Manual releases shall have the following colors:

- a) Red background with the word "open" and/or "trip" in contrasting letters to indicate that the release opens the circuit breaker; and
- b) Green or black background with the word "close" in contrasting letters to indicate that the release closes the circuit breaker.

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## IEC 60947-1 2004 Low-voltage switchgear and controlgear – Part 1: General rules

#### 7.1.5.1 Indicating means

When an equipment is provided with means for indicating the closed and open positions, these positions shall be unambiguous and clearly indicated. This is done by means of a position indicating device (see 2.3.18).

NOTE In the case of enclosed equipment, the indication may or may not be visible from the outside.

The relevant product standard may specify whether the equipment is to be provided with such an indicating device.

If symbols are used, they shall indicate the closed and open positions respectively, in accordance with IEC 60417-2:

60417-2-IEC-5007  On (power)

60417-2-IEC-5008  Off (power)

For equipment operated by means of two push-buttons, only the push-button designated for the opening operation shall be red or marked with the symbol "O".

Red colour shall not be used for any other push-button.

The colours of other push-buttons, illuminated push-buttons and indicator lights shall be in accordance with IEC 60073.

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