IEEE Task force to review the ability to use IEC 62271-101 in place of C37.081, C37.081a and C37.083

As instructed by the motion passed by the HVCB subcommittee on September 24, 2014. The task force (TF) meet on April 28, 2015 to review the ability to use IEC 62271-101 in place of (C37.081, C37.081a and C37.083). If not possible, then the TF will create a project/PAR to revise C37.081 which will include C37.081a, and to include C37.083 if C37.083 does not go into C37.100.2

The meeting was attended by 17 Members and 9 Guests.

Mauricio Aristizabal opened the meeting with introduction of members.

The original motion was presented and discussed by the members and guests of the TF.

Jan Weisker presented a summary of differences between IEEE and IEC testing requirements.

The question presented by the HVCB subcommittee was discussed and the options presented were:

1. Options for C37.081
   - revise
   - withdraw and reference 62271-101 with comments on C37.09

2. Options for C37.083
   - incorporate into C37.100.2 (Common Requirements for Testing of Capacitance Current Switching Devices)
   - incorporate into a possible revision of C37.081
   - withdraw and reference 62271-101 with comments on C37.09

After a discussion on the floor the following motion was presented by Michael Skidmore and seconded by Victor Hermosillo:

“Motion to support C37.09 WG with the references to synthetic testing based on IEC 62271-101 and let C37.081, C37.081a and C37.083 be withdrawn at the end of their validity in 2018.”

The vote was conducted by raise of hands of the members and recorded as follows: Yes= 16, Abstain= 1, No= 0. The motion passed.

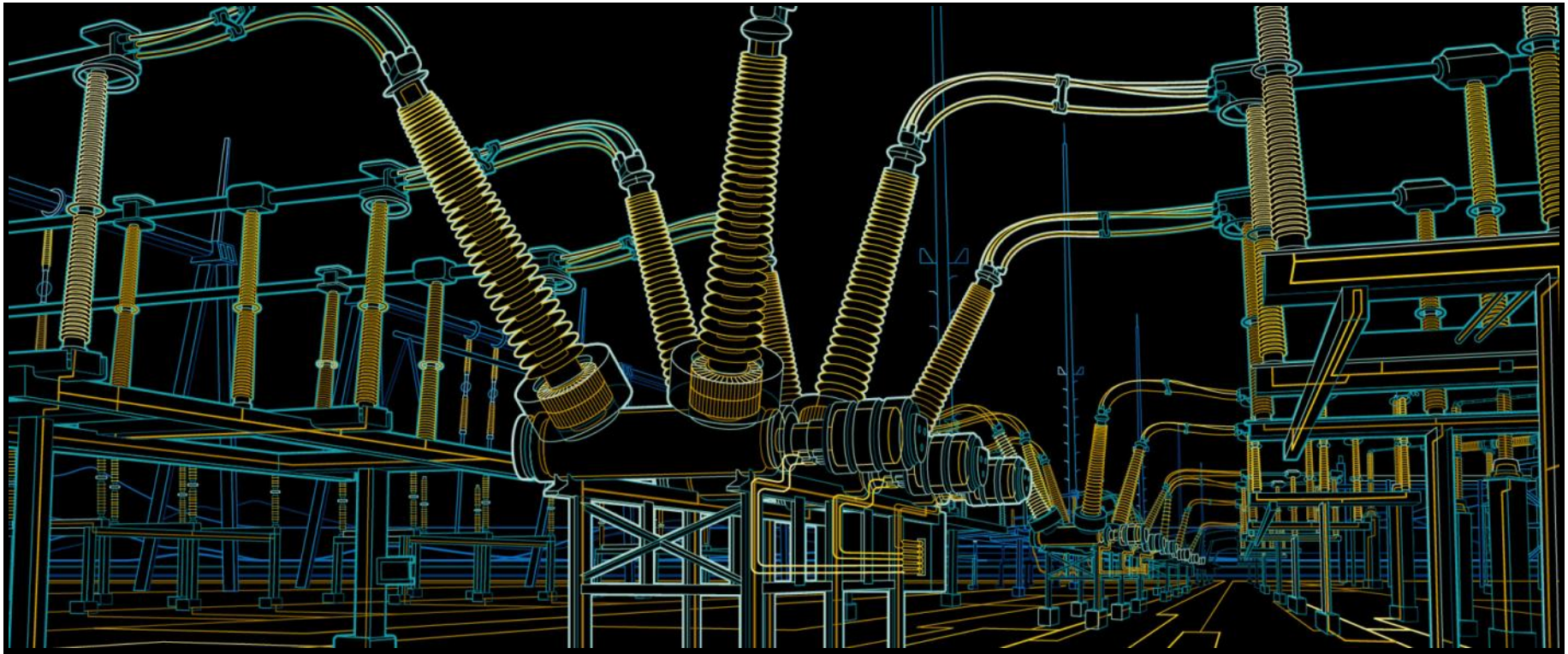
The TF is dissolved and the members will proceed to support C37.09 WG in the proper implementation of the synthetic test references.

Respectfully submitted by Mauricio Aristizabal.

Appendix A: Attendance

First Name	Last Name	Company	Member/Guest
Aasim	Atiq	Siemens Energy	M
Arben	Bufi	Hitachi HVB, Inc.	M
Carl	Schuetz	American Transmission Company (ATC)	M
Casey	Weeks	Siemens Energy	M
Gilbert	Carmona	Southern California Edison	M
Helmut	Heiermeier	ABB	M
Hua Ying	Liu	Southern California Edison	M
James	van de Ligt	CANA High Voltage Ltd.	M
Jan	Weisker	Siemens AG	M
Jon	Rogers	Siemens Energy, Inc	M
Jon	Schumann	American Transmission Company (ATC)	M
Mauricio	Aristizabal	ABB	M
Michael	Skidmore	AEP	M
Sushil	Shinde	ABB Inc.	M
Thomas	Pellerito	DTE Energy	M
Victor	Hermosillo	Alstom Grid	M
Xi	Zhu	GE Energy Management	M
Daniel	Schiffbauer	Toshiba International Corporation	G
Jean-Marc	Torres	Eaton	G
Jeffrey	Brogdon	Georgia Transmission	G
John	Eastman	INCON	G
Peter	Marzec	S&C Electric Co.	G
Roy	Hutchins	Southern Company Services	G
Victor	Savulyak	DNV GL KEMA	G
Vincent	Marshall	Southern Company Services	G
Wangpei	Li	Eaton	G

Appendix B: Presentation



HVCB Taskforce on Synthetic Testing Guides C37.081 C37.081a & C37.083

St. Pete Beach, FL. April 28, 2015

HVCB TF Synthetic Testing Guides
Agenda

- Scope of the Task Force (TF)
- Status of current documents
- IEEE & IEC Testing Comparison
- Steps moving forward

HVCB TF Synthetic Testing Guides
Scope

Motion passed on September 24, 2014, meeting in Asheville:

- “To establish a TF (Task Force) to review the ability to use IEC 62271-101 in place of (C37.081, C37.081a and C37.083). If not possible, then the TF will create a project/PAR to revise C37.081 which will include C37.081a, and to include C37.083 if C37.083 does not go into C37.100.2.”

HVCB TF Synthetic Testing Guides
Status of documents

Document	Description	IEEE Status	Validity
C37.081-1981	Synthetic testing guide	Reaffirmed 2007	Dec. 31, 2018
C37.081a-1997	TRV for asymmetrical terminal tests	Reaffirmed 2007	Dec. 31, 2018
C37.083-1999	Capacitive current synthetic test guide	Reaffirmed 2007	Dec. 31, 2018

SIEMENS

LT and DT High-Voltage Circuit-Breakers - Type Testing acc. ANSI / IEEE and IEC Standards

Overview of Relevant Standards

Common standard for switchgear

ANSI/IEEE	IEC
IEEE Std. C37.100.1 IEEE Standard of Common Requirements for High Voltage Power Switchgear Rated Above 1000 V	IEC 62271-1 High-voltage switchgear and controlgear – Part 1: Common specifications

Product standard(s) for circuit-breakers

ANSI/IEEE	IEC
IEEE Std. C37.04 Rating Structure for AC High-Voltage Circuit Breakers IEEE Std. C37.06 AC High-Voltage Circuit Breakers Rated on a Symmetrical Current Basis IEEE Std. C37.09 Test Procedure for AC High-Voltage Circuit Breakers Rated on a Symmetrical Current Basis	IEC 62271-100 High-voltage switchgear and controlgear – Part 100: Alternating-current circuit-breakers

Short-circuit and Switching Performance – General

SIEMENS

ANSI/IEEE	IEC
• Arcing times not specified • Measuring of contact resistance before and after test is mandatory	• Arcing window is to be verified • Measuring of the contact resistance is not mandatory (except STC) (In future also IEC will require Measuring of the contact resistance, in many cases already common practice)

Higher severity of IEC test as verification of full arcing window during short-circuit and switching performance is required

Short-circuit and Switching Performance – Short-time withstand capability

SIEMENS

ANSI/IEEE

- Duration of short-circuit
  2 s < 123 kV
  1 s ;: 123 kV
- Peak factor 2.5 p. u. for 50 Hz
- Peak factor 2.6 p. u. for 60 Hz

IEC

- Duration of short-circuit
  1 s or 3 s
- Peak factor 2.5 p. u. for 50 Hz
- Peak factor 2.6 p. u. for 60 Hz
- Peak factor 2.7 p. u. for higher dc time constants (> 45 ms)

Higher severity of test acc. IEC as verification of peak factor 2.7 p. u. for higher dc time constants (> 45 ms) may be required

Short-circuit and Switching Performance – Terminal Faults T10 – T100s

SIEMENS

TRV's with some small exceptions harmonized

(some amplitude factors deviate)

ANSI/IEEE

- Test duties T10 to T60
  O – O – O;
  one with 40..60 % asymmetry
- Test duty T100s
  O – CO – CO; symmetrical

IEC

- Test duties T10 to T60
  O – CO – CO; symmetrical
- Test duty T100s
  O – CO – CO; symmetrical

- T10 to T60 acc. IEC cover ANSI/IEEE requirements when additional asymmetrical test is performed
- T100s harmonized between IEC and ANSI/IEEE

Short-circuit and Switching Performance – Terminal Fault T100a

SIEMENS

TRV's with some small exceptions harmonized

(some amplitude factors deviate)

ANSI/IEEE

- Test duty T100a
  O – O – O
  One interruption at rated asymmetry, no further procedure specified

IEC

- Test duty T100a
  O – O – O
  Well defined procedure based on last current loop parameters results in unified test condition

- T100a acc. IEC covers ANSI/IEEE requirements if rated asymmetry was verified (additional test may be required)

Short-circuit and Switching Performance – Short-line faults

SIEMENS

TRV's, line parameters and test currents harmonized

ANSI/IEEE

- Test sequence
  O – O – O

IEC

- Test sequence
  O – CO – CO

IEC test with rated operating sequence instead of single breaking operations considered to be more severe

Short-circuit and Switching Performance – Out-of-phase Condition

SIEMENS

TRV's and test currents harmonized

ANSI/IEEE

- Test duty OP1
  O – O; symmetrical
- Test duty OP2
  O – CO; symmetrical
- Making test on $1{,}5 \times U_r/\sqrt{3}$

IEC

- Test duty OP1
  only in case of critical current
- Test duty OP2
  CO – O – O; symmetrical
- Making test on $2 \times U_r/\sqrt{3}$

- OP1 acc. IEC not mandatory
- OP2 acc. IEC considered to cover ANSI/IEEE requirements
- OP2 Making test acc. IEC is more severe

Short-circuit and Switching Performance – Capacitive current switching

SIEMENS

Testing procedures and parameters harmonized

with following exceptions

ANSI/IEEE

- Classification C0, C1 or C2
- Preferred rating for back-to-back switching with 2 or 3 alternatives

IEC

- Classification C1 or C2
- One preferred rating for back-to-back switching

Capacitive current switching test performed for certain rating and parameters is valid for IEC and IEEE

SIEMENS

Conclusions

Short-circuit and Switching Performance – General

- Higher severity of test acc. IEC as verification of full arcing window during short-circuit and switching performance is required

Short-circuit and Switching Performance – Short-time withstand capability

- Higher severity of test acc. IEC as verification of peak factor 2.7 p. u. for higher dc time constants (> 45 ms) may be required

Short-circuit and Switching Performance – Terminal Faults

- TRV's with some small exceptions harmonized
- T10 to T60 acc. IEC covers ANSI/IEEE requirements when additional asymmetrical test is performed
- T100s harmonized between IEC and ANSI/IEEE
- T100a acc. IEC covers ANSI/IEEE requirements if rated asymmetry was verified (additional test may be required)

Conclusions

Short-circuit and Switching Performance – Short-line faults

- TRV's, line parameters and test currents harmonized
- IEC test with rated operating sequence instead of single breaking operations considered to be more severe

Short-circuit and Switching Performance – Out-of-phase Condition

- OP1 acc. IEC only relevant in case of critical current
- OP2 acc. IEC considered to cover ANSI/IEEE requirements
- OP2 Making test acc. IEC is more severe

Short-circuit and Switching Performance – Capacitive current switching

- Capacitive current switching test performed for certain rating and parameters is valid for IEC and IEEE

HVCB TF Synthetic Testing Guides
Steps moving forward

Options for C37.081

- revise
- withdraw and reference 62271-101 with comments on C37.09

Options for C37.083

- incorporate into C37.100.2 (Common Requirements for Testing of Capacitance Current Switching Devices)
- incorporate into a possible revision of C37.081
- withdraw and reference 62271-101 with comments on C37.09

HVCB TF Synthetic Testing Guides
Motion

Motion to support C37.09 WG with the references to synthetic testing based on IEC 62271-101 and let C37.081, C37.081a and C37.083 be withdrawn at the end of their validity in 2018.