Minutes of Meeting **1. October. 2012**

WG: C37.010 - Circuit breaker application Guide
Chair:Helmut Heiermeier
Location: San Diego

Participants: 40 members
19 guests

1.) The chair started the meeting with the introduction of all participants.

2.) The chair reviewed the agenda for the meeting.

3.) The chair asked to approve the MOM (Minutes of Meeting) from the previous meeting in (Saint Pete Beach). There were three comments to the MOM by the committee:

a.) In the title the location of the meeting was incorrect. The location was listed as Orlando and should be Saint Pete Beach. This will be corrected and distributed with the next MOM for approval.

b.) Item #16 of the Saint Pete Beach MOM was listed as; "Several comments provided by Denis Dufournet for the draft copy provided on 4-20-12." Denis commented that he would like acknowledgement that his comments provided on 4-20-12 were reviewed, accepted, and would be incorporated into the document. Helmut agreed that his comments were accepted and will be added to the revised MOM.

c.) Helmut commented that topic #17 in the Saint Pete Beach MOM was not completed. During the last HVCB meeting it was recommended that we wait until the new balloting process is reviewed before we go for ballot. Topic #17 from the Saint Pete Beach (MOM) was listed as follows: "In general, the committee suggested that PC37.010 be submitted for ballot. There is much work that needs to be done but if a ballot is issued then more formal comments can be obtained and revisions will follow." The chair commented the document will be released for ballot but will be discussed later."

4.) The committee discussed the work completed to date. A draft copy was e-mailed by Helmut on 8-28-12 (Draft 3b) to listed members and guests. Some members and guests commented they did not receive the document. Helmut will review the list again and verify contact information.

5.) The chair reviewed the status of the PAR and expiration date. The PAR will expire on 12-31-14.

6.) The list of topics discussed at the meeting is attached below to the Minutes of Meeting.

7.) Section 5.26 Circuit Breakers used on the high side of a GSU (generator step up transformer) was reviewed at the meeting. Some commented the word "missing" should be replaced with "delayed" So the new proposed wording should be "In rare case it may be possible to experience delayed current zero's" The working group chair will review the comments and revise the section accordingly.

8.) Section 5.25 Influence of circuit breaker behavior to other devices was reviewed. Comments were made that the wording in paragraph #3 of the agenda for 5.25 be changed to: High over-voltage may be created when switching reactors". Technically, the breaker does not cause the over voltage but station components and system conditions and how the breaker is switched, may cause the over voltage and not just the breaker. Helmut will review the wording. Additionally he will see if C37.015 can be referenced into the document too.

9.) The chair reviewed suggested changes to Figure #2 – operating time graph in C37.010. He added additional information for closing resistor applications. Several comments were made and most seemed to like the new graph. The information will be added to the document for ballot.

10.) New proposed wording for Section 5.7 was reviewed. The committee discussed 300 ms reclosing time within the duty cycle. The draft information presented by Helmut for PC37.010 provided some rational or clarification why 300ms reclosing time is used to allow time to de-ionize the flashover region in air.

11.) The chair reviewed several issues and contradictions to the definition for "rated interrupting times" between several different guides. The wording for IEC, C37.04, C37.09, and C37.010 do not seem to be aligned and correct. Additionally, there are some differences in the wording for additional interrupting cycle time if asymmetrical faults occur at normal or elevated X/R values. Helmut reviewed the new proposed wording for interrupting times. Helmut plans to keep the wording for ballot as discussed in the meeting. He will also review the information again but other guides should also be aligned better with the definition.

12.) The committee briefly discussed comments for switching lines with series capacitors.

13.) Section 5.24 closed pressure systems were reviewed with no comments.

14.) Section 5.27 Circuit Breakers – Resistor Energy Limitations was reviewed with no comments.

15.) At the very end of the meeting some discussion took place to remove all the old references in C37.010 that did not apply. Many agreed that old information that does not apply should be moved to an annex. Carl Schuetz and Jim van de Ligt volunteered to check all the applicable information to be moved to the Annex.

16.) Sean (Xi) Zhu reviewed Table A2 of section of C37.06 for "Switching Surge Factor." Notes in the guide suggest this topic and table should be moved to C37.010. He asked others if they remember the history why the table or topic should be moved into C37.010. After some discussion the chair and others agreed the information for Switching Surge Factor should be moved into C37.010. Helmut said he would review the information.

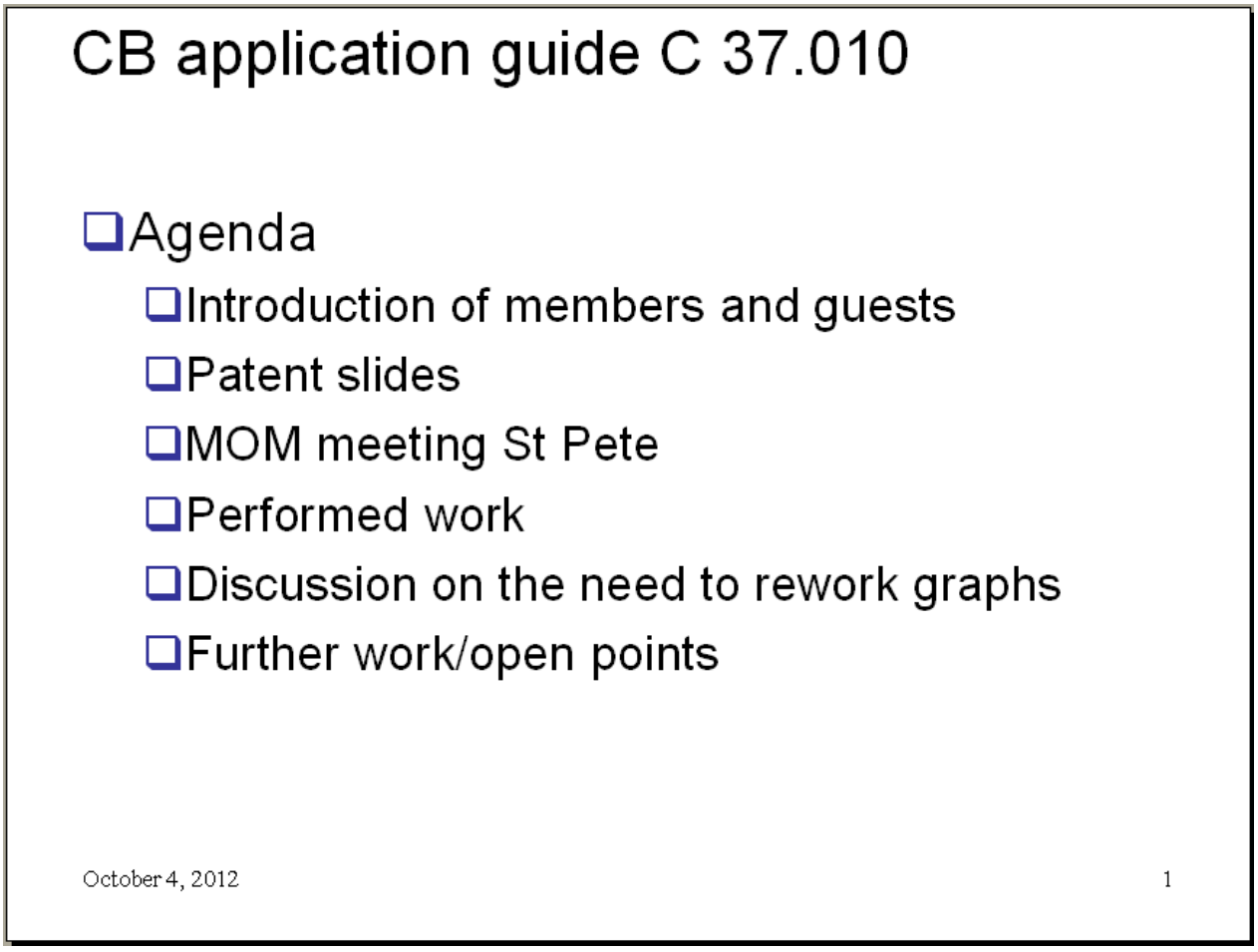
17.) During meeting for C37.012 the chair Anne Bosma suggested that C37.010 may need to take breaker with closing resistor information in C37.012 and move it into C37.010. The working group chair added this to the list of tasks.

18.) The chair again said the document should be balloted and comments should be available prior to the next meeting in Galveston. In order to meet this, the document should be out for balloting by February 2013. The working group needs to apply for the allowance to go for ballot.

19.) The working group chair briefly reviewed comments from a draft compilation of comments (PC37.010-D3). This is a running list of revisions and comments made to the guide.

20.) The working group committee agreed to adjourn meeting.

The following is information is from the PowerPoint presentation during the meeting:



CB application guide C 37.010

- Status of working group
  - PAR approved
  - PAR expires end of 2014
  - assumed document by than

CB application guide C 37.010

- Work done after St Pete
  - Complete document based on Word format
  - All equations made editable
  - Editorial changes
  - Introduction

CB application guide C 37.010

- Items to be discussed

How to adress different temperature ranges

CB application guide C 37.010

- Items to be discussed new

Use as generator circuit breaker

5.26 Circuit breakers used on high side of GSU(generator step up transformer

The present standard don't cover this specific case. However in some cases standard breakers may be used in such applications. In this case special attention need to be drawn to the following conditions.

High number of load current switching

Special condition which may occur when synchronizing a generator with a network

Higher than standard asymmetries (mainly related to lower short circuit currents)

In rare case it may be possible to experience missing current zero's

Since these cases are rare it is necessary to threat them on a case by case base.

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- Items to be discussed new

Influence of circuit breaker behaviour to other devices

5.25 Influence of circuit breaker behavior to other devices

A circuit breaker may influence the required capabilities of other devices in the substation by it's inherent behavior. Examples where special attention should be paid are given below.

In case a circuit breaker has a bigger spread in mechanical closing time between it's phases (either by intention or by it's inherent behavior) a higher peak current when making a short circuit may occur. In such a case other devices in the substation may be overstressed with regard to the maximum short circuit peak and the next higher current rating for these devices may be necessary.

A circuitbreaker may create high overvoltage when switching reactors. Theses overvoltages may exceed the maximum allowed voltages for other equipment in the substation. In such cases additional measures may be necessary like controlled switching to reduce the overvoltages, arrestors or equipment with higher voltage withstand capability.

Most circuit breakers are supplied with additional equipment such as; bushing current transformers (BCT), free standing current transformers, liner couplers, or bushing potential devices. Although a circuit breaker may have adequate continuous current, fault current, and voltage rating capability; the user should review the rating of the accessory equipment supplied with the circuit breaker. Typically devices such as, current transformer will have RF (rating factor) for associated primary and secondary taps. Depending on tap selection, the circuit breaker's current transformers may be underrated for the application and could possibly result in a failure of the device and/or breaker. The user should consider such equipment in the application and the circuit breaker manufacturer should be consulted for possible de-rating requirements. Normative Annex in C57.13 provides additional information for bushing current transformers along with standard SG-4.

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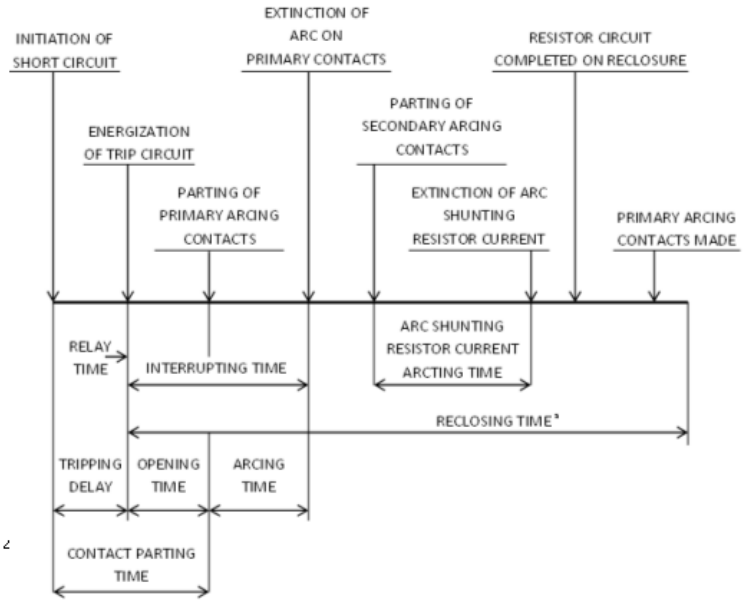
- Items to be discussed new

Is this figure correct? Do we need to consider resistorapplication?



CB application guide C 37.010

- Items to be discussed new

Clarification on 300ms reclosing time (5.9)

The rated reclosing time is defined to be 300ms. This time should not be shortened in service. The rational behind the 300 ms is the time which is need to de-ionise the flashover region in air. If the fault was not a permanent one a succesfull reclosing should be than highly probable.

- The rated reclosing time is 300ms. This time should not be shortened in service. The rational behind the 300 ms is the time which is need to de-ionise the faulty position in air. This time depends also on the nominal voltage of the system, but the defined time of 300ms is assumed to cover all cases. If the fault was not a permanent one a succesfull reclosing should be than highly probable. Special attention is needed if a probability of secondary arc's exists. These secondary arc's may occur if capacitve coupling between the healthy phases and the faulty phases exist. In such cases additional measures may be necessary to extinguis or to commutate the secondary arc.

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- Items to be discussed new

Closed pressure systems (5.24)

5.24 Closed pressure system (gas filled)
appended by:
Gas filled circuit breakers are designed to have a maximum leakage rate as defined in ???? or given by manufacturers. Frequent check of the filling condition is necessary to determine possible losses. In case the losses are higher than the allowed losses action need to be taken to avoid releasing too much gas into the environment.

CB application guide C 37.010

- Proposals for added wording new

5.27 Circuit Breakers – Resistor Energy Limitations (For Consideration)

Circuit breakers with tripping and/or closing resistors may require a limited duty cycle. Factors such as resistance value (ohm), applied voltage, pre-strike conditions, out of phase voltage conditions, resistor insertion time, cooling interval of resistor, and circuit breaker operating duty cycle should be considered by the user and manufacturer. Several uncontrolled closing and/or opening events on a circuit breaker with an opening or closing resistor may exceed the resistor energy capability and result in a failure of the equipment.Usually the closing at out of phase conditions is the limiting factor with regard to energy input. Closing at precharged (trapped charged) lines is not considered to be critical with regard to energy input. The manufactures should be consulted for energy and operating duty cycle limitations to the circuit breaker with such equipment.

CB application guide C 37.010

- Items to be discussed new

5.7 rated interrupting time

For line-to-ground faults, the interrupting time is estimated to exceed the rated interrupting time by 0.1 cycle. For asymmetrical faults, it is estimated that the interrupting time may exceed rated time by an additional 0.2 cycle. Hence, for grounded asymmetrical faults, the last phase to clear is estimated to be 0.3 cycle slower than the rated interrupting time. This extension of the rated interrupting time is based on standard X/R ratios. In case of much higher X/R ratios an even bigger extension may be seen. The rationale behind is the fact that the current zero's at which the breaker is able to interrupt, are delayed. Additionally, rated interrupting time may be exceeded during extreme cold weather (see 4.2.1) or when the breaker has been closed for an extended period of time. Also, the breaker may be slower at the lower limits of control voltage and/or mechanism stored energy. These longer interrupting times are in the range of several milliseconds and may have system stability

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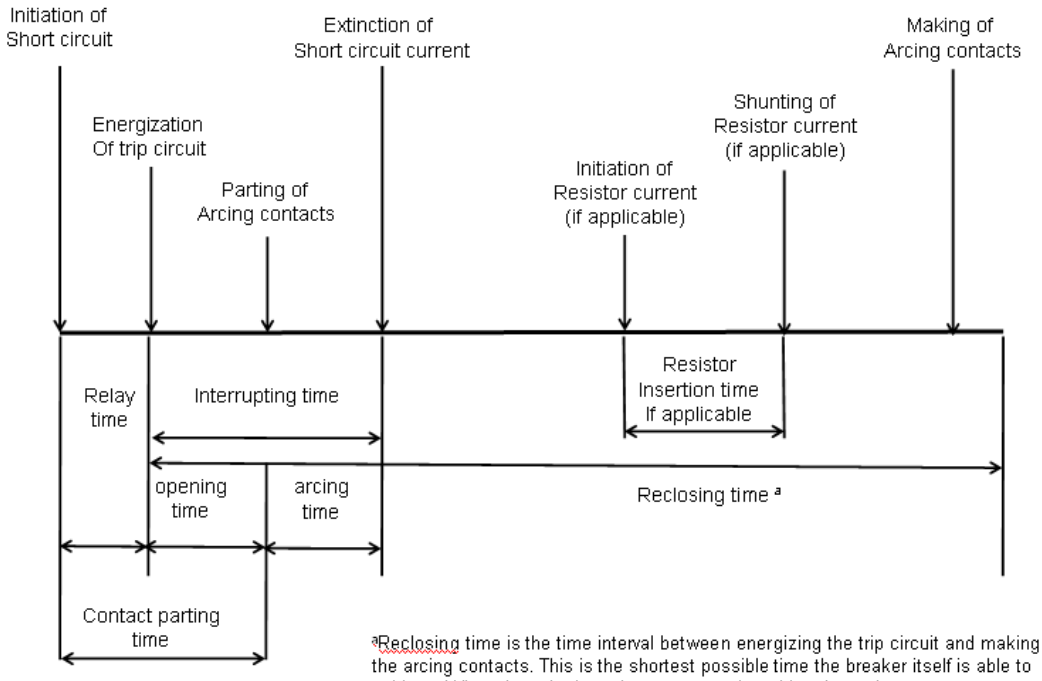

[a]Reclosing time is the time interval between energizing the trip circuit and making the arcing contacts. This is the shortest possible time the breaker itself is able to achieve. Where low ohmic resistors are used, making the resistor contact on reclosure may be more significant .In service an additional time delay (300ms) is inserted to allow the fault location to be deionised.

CB application guide C 37.010

- Items to be discussed new

5.27 **Switching lines with Series Capacitors**

The line side component of the TRV may have a dc offset. The magnitude of the dc offset, depends on several factors:

The degree of compensation of the line.
The loading (or fault current) of the line at the instant of opening.
Whether or not the remote end of the line is still connected (i.e. networked or faulted line)
If the remote end is open, it depends how much line is beyond the series capacitor, and the phase sequence of the opening.

This is a multifaceted issue and needs to be carefully studied with switching transient simulation.

In most cases the TRV Peak will be higher than a non-series-compensated line. However it has to be carefully checked whether the existing type test evidence cover this special switching case. This might be the case since the type test evidence is often based on worse case assumptions with regard to phase factors. The manufacturer may be consulted if further evidence is needed.

CB application guide C 37.010

- Items to be discussed new

- Contradiction to C 37.04

5.6 Rated interrupting time

The rated interrupting time of a circuit breaker is the maximum permissible interval between the energizing of the trip circuit at rated control voltage and rated operating pressure for mechanical operation, and the interruption of the current in the main circuit in all poles. The interrupting time for a close-open operation shall not exceed the rated interrupting time by more than 1 cycle of rated power frequency for circuit breakers with interrupting times of 5 cycles or more, and 1/2 cycle for circuit breakers with interrupting times of 3 cycles or less. (Cycles are based on corresponding rated power frequency.)

- Wording in C37.010 (black is existing wording)

For line-to-ground faults, the interrupting time is estimated to exceed the rated interrupting time by 0.1 cycle. For asymmetrical faults, it is estimated that the interrupting time may exceed rated time by an additional 0.2 cycle. Hence, for grounded asymmetrical faults, the last phase to clear is estimated to be 0.3 cycle slower than the rated interrupting time. This extension of the rated interrupting time is based on standard X/R ratios. In case of much higher X/R ratios an even bigger extension may be seen. The rationale behind is the fact that the current zero's at which the breaker is able to interrupt, are delayed. Additionally, rated interrupting time may be exceeded during extreme cold weather (see 4.2.1) or when the breaker has been closed for an extended period of time. Also, the breaker may be slower at the lower limits of control voltage and/or mechanism stored energy. These longer interrupting times are in the range of several milliseconds ~~and may have system stability implications.~~

CB application guide C 37.010

- Items to be discussed new

- Wording in C37.06 2000

(5) The ratings in this column are the maximum time interval to be expected during a breaker opening operation between the instant of energizing the trip circuit and the interruption of the main circuit on the primary arcing contacts under certain specified conditions. The values may be exceeded under certain conditions as specified in ANSI/IEEE C37.04, sub-clause covering "Rated Interrupting Time."

- Can the application guide beign used to clarify?
- Would a request to C 37.04 be needed to clarify?

CB application guide C 37.010

Definition in C37.09

4.6 Interrupting time tests

The rated interrupting time is established by adding the contact opening time to the maximum arcing time of the circuit breaker. The contact opening time of the circuit breaker shall be measured prior to the initiation of the short-circuit tests, under the pressures and control voltages specified in the rated interrupting time of IEEE Std C37.04-1999. The contact opening time corresponds to the elapsed time between the energization of the trip coil and the instant when the contacts separate. The arcing time of the circuit breaker is deter-
mined,

4.8.1.4 Obtaining the most severe switching conditions

To demonstrate the required interrupting capability of a circuit breaker, it is necessary to show that the circuit breaker is capable of meeting the requirements for the rated interrupting time, the rated short circuit current, and related required capabilities in accordance with the requirements set forth in IEEE Std C37.04-1999 and ANSI C37.06-1997, under the most severe switching conditions. The most severe conditions are considered to be those where the maximum arcing energy input is seen by the interrupter during interruption as a result of variations of the arcing time that are due to the relationship between contact parting time of the circuit breaker and the natural current zeros of the short-circuit current. It must be shown that the circuit breaker is capable of interrupting the rated current, within its limitations for asymmetry and interrupting time, with the current zeros occurring in such relation to the contact parting as to yield approximately the longest arcing time.

To satisfy the above conditions the opening operations for test duties 4, 5, 6, and 7 of Table 1 shall have the corresponding arcing times, in ms, as outlined below. For each test duty, the minimum arcing time shall be specified by the manufacturer.

CB application guide C 37.010

Rated interrupting time, proposed wording

Interrupting time¶

The rated interrupting time of a circuit breaker is the maximum permissible interval between the energization of the trip circuit at rated control voltage and rated mechanism pressure and the interruption of the current in the main circuit in all poles. The rated interrupting time is based on 3 phase faults under rated conditions. It is used to classify breakers of different opening times ~~speeds~~.¶

The rated interrupting time may be exceeded for close-open operations. The increase in interrupting time on close-open operation may be important from the standpoint of possible system instability. For low values of current, these considerations are less important.¶

At duties below 25% of the required interrupting capability at rated maximum voltage, the time required for interruption for oil and air magnetic breakers may be greater than the interrupting time by as much as 50% for 5-cycle and 8-cycle breakers, and 1 cycle for breakers of 3 cycles or less.¶

The rated interrupting times of specific circuit breaker ratings are given in the tables of IEEE Std C37.06-1997. Short interrupting times may be significant where system stability is critical. Application considerations including required margins should be incorporated in determining expected clearing time.¶

For line-to-ground faults, the interrupting time is estimated to exceed the rated interrupting time by 0.1 cycle. For asymmetrical faults, it is estimated that the interrupting time may exceed rated time by an additional 0.2 cycle. Hence, for grounded asymmetrical faults, the last phase to clear is estimated to be 0.3 cycle slower than the rated interrupting time. This extension of the rated interrupting time is based on standard X/R ratios. In case of much higher X/R ratios an even bigger extension may be seen. The rationale behind is the fact that the current zero's at which the breaker is able to interrupt, are delayed. Additionally, rated interrupting time may be exceeded during extreme cold weather (see 4.2.1) or when the breaker has been closed for an extended period of time. Also, the breaker may be slower at the lower limits of control voltage and/or mechanism stored energy. These longer interrupting times are in the range of several milliseconds ~~and may have system stability implications.~~¶

Attendance list

First Name	Last Name	Role	Company
Helmut	Heiermeier	Chair	ABB
Michael	Skidmore	Secretary	AEP
Xi	Zhu	Vice-Chair	HICO America
Roy	Alexander	Member	RWA Engineering
Mauricio	Aristizabal	Member	ABB
George	Becker	Member	The United Illuminating Company
W.J. (Bill)	Bergman	Member	PowerNex Associates Inc.
Stan	Billings	Member	Mitsubishi Electric PP
Anne	Bosma	Member	ABB AB
Cody	Brehm	Member	American Transmission Company
Arben	Bufi	Member	HITACHI HVB
Gilbert	Carmona	Member	Southern California Edison
Steven	Chen	Member	Chenhouse North America
Chih	Chow	Member	PEPCO
Denis	Dufournet	Member	Alstom Grid
Ken	Edwards	Member	Bonneville Power Administration
Victor	Hermosillo	Member	Alstom Grid
Stephen	Lambert	Member	Shawnee Power Consulting
Hua Ying	Liu	Member	Southern California Edison
Albert	Livshitz	Member	Schneider Electric Services
Bjorn	Lofgren	Member	Siemens Energy
Dave	Mitchell	Member	Dominion
Jeffrey	Nelson	Member	Tennessee Valley Authority
Mirko	Palazzo	Member	ABB
Shawn	Patterson	Member	US Bureau of Reclamation
Thomas	Pellerito	Member	Detroit Edison
Lise	Phan	Member	Parcific Gas and Electric Company
Reynaldo	Ramos	Member	Southern Company
Anthony	Ricciuti	Member	Eaton Corporation
Jon	Rogers	Member	Siemens Energy
Charles	Ross	Member	PGH Wong Engineering
Roderick	Sauls	Member	Southern Company Services
Carl	Schuetz	Member	American Transmission Company (ATC)
Devki	Sharma	Member	Consultant
Sushil	Shinde	Member	ABB Inc.
Don	Steigerwalt	Member	Duke Energy
James	van de Ligt	Member	CANA High Voltage Ltd.
John	Webb	Member	ABB
Mehmet	Adanur	Guest	Southern Company Services
William	Bane	Guest	Nashville Electric Service
Donald	Cantrelle	Guest	Georgia Power
Lucas	Collette	Guest	Mitsubishi Electric Power Products
Dave	Collette	Guest	Mitsubishi Electric
John	Hall	Guest	Tennessee Valley Authority
Charles	Hendrickson	Guest	Arizona Public Service Company
Anton	Janssen	Guest	Liander
Wangpei	Li	Guest	Eaton
Antonio	Mannarino	Guest	PSE&G
Vincent	Marshall	Guest	Southern Company Services
Tom	Mulcahy	Guest	Dominion
Alan	Peterson	Guest	Utility Service Corporation
Donald	Swing	Guest	Southern States
Vernon	Toups	Guest	Siemens
Wes	Wadsworth	Guest	Hitachi HVB
Oon	Yek	Guest	Pacific Gas & Electric
Richard	York	Guest	TE Connectivity
Shane	Ford	Guest	Nashville Electric Service
Bill	Long	Guest	
jiong	Zhang	Guest	

Compilation of comments:

[Annex]

Date	Document	Project Nr.
	C37.010 D2	

	Line number	Clause/ Subclause	Paragraph Figure/ Table	Type of comment (General/ Technical/Editorial)	COMMENTS	Proposed change	OBSERVATIONS OF THE SECRETARIAT on each comment submitted
Denis Dufournet		2		E	Incorrect references	Change IEEE Std C37.06.1-1997 to ANSI Std C37.06.1-1997 Change IEEE Std C37.01 1-1994 to IEEE Std C37.011-2011 Change IEEE C37.06-1997 to IEEE Std C37.06-2009 Change IEEE Std C37.012-1979 to IEEE Std C37.012-2005 Change IEEE Std C37 .015-1993 to IEEE Std C37:015-2009 Same changes in other subclauses ?	Done
Denis Dufournet		5.7	1st	T	Present text The rated interrupting time of a circuit breaker is the maximum permissible interval between the energization of the trip circuit at rated control voltage and rated mechanism pressure and the interruption of the current in the main circuit in all poles. It is used to classify breakers of different speeds.	Remove the last sentence that is technically incorrect. (speed is not the only factor), arcing times are not necessarily function of speed (in some cases the minimum arcing time can be shorter with a lower speed)	done
Denis Dufournet		5.11		E	Present text For transient recovery voltage (TRV), see IEEE Std C37.011-1994; and for fast TRVs associated with transformers or reactors, see IEEE Std C37.06.1-1997.	Change to For transient recovery voltage (TRV), see IEEE Std C37.011-2011; and for fast TRVs associated with transformers or reactors, see ANSI Std C37.06.1-1997.	done
Denis Dufournet		5.13		T	Present text Capacitance current switching is defined in IEEE Std. C37.04a 2003 as well as in IEEE Std C37.12	Change to Capacitance current switching is defined in IEEE Std. C37.04a 2003 and guidance is given in IEEE Std C37.012	done

	Line number	Clause/ Subclause	Paragraph Figure/ Table	Type of comment (General/ Technical/Editorial)	COMMENTS	Proposed change	OBSERVATIONS OF THE SECRETARIAT on each comment submitted
jan Weisker		5.9			last para "...if capacitve coupling....exist" There is always capacitve coupling between phases and also the inductive coupling plays a "minor" role.	It could be helpful to give some more infomation on secondary arc issues. I can prepare something if you want. (Just a few sentences)	it says more information needed, don't know how to change this
jan Weisker		5.10.2			Page 30, 3rd para, last line - two full stops - delete one		Not sure what he means
jan Weisker		5.19			Figure - Key in the figure make t10 to T10		I cannot change the graph Done
jan Weisker		5.24			Lekage rate is given in C37.04, clause 6.6.1		done
jan Weisker		5.24			3rd para, first line add a blank in circuitbreaker		done
Devki Sharma		4.3.2			replace the reference C37.04 by C37.017		done
Devki Sharma		refernces			• In the references clause delete C57.19.00, and replace it by C37.017 IEEE Standard for Bushings for High-Voltage [over 1000 V(ac)] Circuit Breakers and Gas-Insulated Switchgear.		done

	Line number	Clause/ Subclause	Paragraph Figure/ Table	Type of comment (General/ Technical/Editorial)	COMMENTS	Proposed change	OBSERVATIONS OF THE SECRETARIAT on each comment submitted
Devki Sharma		4.2.8			• I have sent the attached draft revision of Annex C of C37.100.1 to Dave Stone. This annex deals with Exposure to Pollution. I am not sure whether in future C37.010 will refer to C37.100.1 or whether both will have the same information, depending upon which one gets published first. Assuming that C37.100.1 is published first, delete existing 4.2.8 of PC37.010, including Tables 1, and 2, and refer to Annex C of C37.100.1.		What?
chchow		Clause 2 – Normative References			IEEE Std C37.017 (2010) [Bushings for High-Voltage Circuit Breakers and Gas Insulated Switchgear] should be added to this list. C57.19.00-1991 is out dated and applies only to those TBI (transformer breaker interchangeable) type, oil bushing.		Done but Double check
chchow					) From page 30 onward, new figures and tables were added. (a) Draft Std has new Figures 4, 5, 6 and 7 added. And Figure 4 of current Std should now be re-label as Figure 8 (b) New data 6 was added to Table 6 in Draft Std. Therefore, Table 6 of current Std shall now become Table 7.		Figure 8 exist already, p33. So I don't know what a) means b) There is only one Table 6.

	Line number	Clause/ Subclause	Paragraph Figure/ Table	Type of comment (General/ Technical/Editorial)	COMMENTS	Proposed change	OBSERVATIONS OF THE SECRETARIAT on each comment submitted
chchow		5.18.2 b			(a) IEC notations such as R-S-T, R-Y-B were used. (b) IEEE notations such as A-B-C should be used or listed side by side. (I am not sure what Y and B stands for in IEEE notation).		Done. I added A-B-C next to it, not sure if it is right
chchow			figures 16, 17		) (a) There are a numbers of figures being re-drawn but some data are either missing or overlaid		Don't know how to change this
chchow			Table 3		Some symbols do not print out correctly on paper. For example, the symbol for "allowable hottest-spot total temperature" in Table 3 [second column, second and third rows, as well as in the footnotes for this table].		Don't know how to change this
Gilbert Carmona		Clause 1.2 Purpose				Suggest to include the following: "This guide is intended for general use in the application of "AC High-Voltage Circuit Breakers Rated On a Symmetrical Current Basis. "Familiarity with other American National Standards specific to other breaker applications such as switching capacitance banks, reactors, and generators is assumed, and provisions of those standards are indicated in this guide only when necessary for clarity in describing application requirements.	
Gilbert Carmona		Clause 5.10.2 Asymmetrical Requirements:				Add a 4th parameter that stresses breakers; "Location of the generator and number of transformation to the fault. "For instance, a "local" fault, i.e. a fault close to the generator, the ac initial short-circuit current due to the subtransient reactances of generators and motors must be compared to the close and latch capability of the breaker as well.	

	Line number	Clause/ Subclause	Paragraph Figure/ Table	Type of comment (General/ Technical/Editorial)	COMMENTS	Proposed change	OBSERVATIONS OF THE SECRETARIAT on each comment submitted
Gilbert Carmona		Clause 5.10.2 Asymmetrical Requirements				The statement that the stresses are unlikely to occur looks like the guide is giving permission to the application engineer to accept somehow an overstressed breaker where the fault exceeds the breaker symmetrical and close and latch rating of the breaker. "SUGGEST TO DELETE THIS PARAGRAPH.	done
Gilbert Carmona		Clause 5.18.2 b) Capacitor Bank De-energization				Capacitor Bank De-energization: Suggest to replace the phase sequence designator from R-S-T to A-B-C to be consistent with the American phase designation.	done
Gilbert Carmona		Clause 5.18.2.h) Transformer Energization				Add as breaker with insertion resistance and capacitance across the transformer winding as additional acceptable means of reducing transformer inrush current.	a correct place need to be found
Gilbert Carmona			Figures A.3 & A.4		Total Current		
San Diego		5.26				The word missing should be replaced by delayed…current zero's	done
San Diego		5.26				change high overvoltages may be created when switching reactors	done
San Diego		5.26				make reference to C37.015	done
San Diego		6				move all old refernces related to older technologies to an Annex	
San Diego						table A2 for switching surge factors of C37.06 should be introduced	done
San Diego		5.27				the figure from C37.012 should be introduced (basic closing resistor outline)	

	Line number	Clause/ Subclause	Paragraph Figure/ Table	Type of comment (General/ Technical/Editorial)	COMMENTS	Proposed change	OBSERVATIONS OF THE SECRETARIAT on each comment submitted
San Diego					there are no information on service capability in	put some explanantion on the 800% service capability in (C37.04)	done