Minutes of the Meetings held on October 11th to 13th, 2017 in Portland, USA

Joint IEC/IEEE Maintenance Team for IEC/IEEE 62271-37-013

The Maintenance Team (MT) met on October 11th to 13th, 2017 in Portland, ME, USA with 16 members and 8 guests.

The meeting started with the introduction of all participants.

The following people attended the meetings: see Annex A

Main points:

The minutes of the meeting held in Villeurbanne in June 2017 were approved.

The agenda proposed for the three-day meeting was approved by the MT members.

A new member has been appointed in IEC representing Canada: Mr D. Peelo.

The following comments made by STL TG16 (STL Guide to the interpretation of IEC/IEEE 62271-37-013: Edition 1.0: 2015-10) during the meeting held in Villeurbanne (FR) in June 2017 related to IEC/IEEE 62271-37-013: Edition 1.0: 2015-10 have been reviewed:

- **6.102.4.2 Unit testing**
  - Does it make sense to keep this clause? To the opinion of TG16 generator circuit-breakers with more than one unit do not exist. Please reconsider→MT decision: no change in the document
- **6.102.7 Alternative operating mechanisms**
  - TG16 recommends to adapt clause 6.102.7, taking into consideration the clause 6.1.102 and 6.102.7 of the newly issued IE62271-100 Edition 2.2 2017-06→MT decision: new text in cl. 6.107
- **6.103.4 and 6.105.4 Connection of test circuit to generator circuit-breaker**
  - The standard requires: *"Where it cannot be demonstrated satisfactorily which connection gives the more severe conditions,*" This implies that in most cases

between test duties the connection of test circuit to generator circuit-breaker shall be reversed. However, for bigger units this is not practical and TG16 proposes to reconsider this requirement→MT decision: new text implemented in the captioned clauses

- **6.103.7 System-source short-circuit breaking current**
  - The header of this clause is not in line with the required tests series listed in Tables 16 and 17, comprising of not only breaking currents, but also making tests. TG16 recommend to adapt this header→MT decision: accepted
- **6.105.7.3 Degree of asymmetry of generator-source short-circuit breaking current**
  - To the opinion of TG16, the text in the second paragraph in clause 6.105.7.3 starting with *"It is generally accepted that the generator ….."* should be put in a NOTE instead of the mean text. Please reconsider→MT decision: text revised accordingly
- **6.105.12 Generator-source short-circuit breaking test-duties**
  - The header of this clause is not in line with the required tests series listed in Tables 18 and 19, comprising of not only breaking test-duties, but also making tests. TG16 recommend to adapt this header, using basically the same wording as in clause 6.103.7→MT decision: accepted
- **B.2.5 Short-circuit making and breaking tests**
  - Clause h 2) requires that the arc-voltage (applicable to test-duties 5, 6A and 6B only) shall be included in the test report. But arc-voltage is not a numeric value. It is not clear which value must be taken. TG16 proposes to reconsider this requirement→MT decision: text modified accordingly in B.2.5 and B.2.10
- **Page 108**
  - In the text "*Before the second valid opening operation it is necessary to establish the minimum arcing time $t_{arc\ min\ 2}$ derived from a phase with intermediate asymmetry level after a minor loop in a three-phase system (Figure 28)"* on page 108, below Figure 27 reference is made to Figure 28. This, however, should be Figure 24. Please modify→MT decision: accepted

In cl. 6.102.10.3.2 and 6.102.10.3.3 the text has been modified to clarify that the sentence "Visual inspection shall show that re-ignition occurred between arcing contacts." is correct, but only applicable in case of synthetic testing. In case of direct testing the generator circuit-breaker will not be able to clear, if re-ignition takes in another place than between arcing contacts.

A concern has been raised by some members of the Switchgear Assemblies (SA) subcommittee within IEEE regarding a possible scope infringement of IEC/IEEE 62271-37-013. This concern is related to the task which is being undertaken within IEC/IEEE 62271-37-

013 with the goal to ensure the coordination and proper selection of ratings of additional components (e.g. disconnector for SFC, earthing switches, etc…) when part of the generator circuit-breaker system. It is obvious that the ratings of these components shall be aligned to that of the generator circuit-breaker but unfortunately this alignment is not addressed properly in the standards for switchgear.
In agreement with some members of SA, the following actions shall be taken:

- neither title nor scope of IEC/IEEE 62271-37-013 will be modified;
- the proper terminology to address the generator switchgear will be implemented in IEC/IEEE 62271-37-013 once such information is provided by SA;
- some members of IEC/IEEE 62271-37-013 will join the WG meetings of IEEE C37.20.2 and C37.20.3 to support harmonisation of content between these documents and IEC/IEEE 62271-37-013;
- references to ground and test devices will be removed from IEC/IEEE 62271-37-013 as they are already addressed by C37.20.2.

The proposal made by DP regarding the calculation of TRV has been reviewed by the MT (see Annex B). The proposal specifically addresses how to calculate TRV requirements without resorting to simulations. To the MT it was not clear whether the proposal refers to the calculation of power plant-specific TRV to assess application requirements or of test circuits TRV to assess the testing requirements. In the former case, the MT agreed that the factors applied in the formulas taken from e.g. table 3 of the standard should be otherwise calculated starting from the power plant equipment design/tested parameters. In the latter case, some more explanations are required specifically to address the cases of out-of-phase and load current switching tests (i.e. tests reproducing the stress on the generator circuit-breaker when the TRV is associated to two voltage sources).

Some general comments received from MC have been discussed and resolved (see Annex D).

The proposal made by SF to add the sentence “Generator circuit breakers previously tested to the requirements of the tests in IEC/IEEE 62271-37-013:2015 do not require retesting unless the design changes in a manner that would affect performance” was rejected as the MT agreed that this sentence does not belong to a standard.

The proposal made by SF to replace Figure 9 with the provided new one in black and white colour has been accepted.

The MT agreed to harmonize the use of test plant, facilities, etc throughout the document.

The following action items have been reviewed.

Action item 1
The MT discussed and preliminarily accepted the proposal made by MP regarding the calculation of the prospective TRV for out-of-phase current switching modified by the capacitors of generator circuit-breakers (see Annex C). The tables on which the proposal is based will be further developed after the first tables provided in Annex C are checked and approved. It has agreed that for the first CD, the tables available at that time will be included with a note that the remaining tables are under development.

Action item 10
The proposal made by LZ to harmonize the requirements of individual components with those of generator circuit-breakers when part of a system has been included in the main document till and including cl. 6 (see the parts marked yellow in the document "iecieee62271-37-013{ed1.0}en_rev-v18.pdf" - the table of contents, the list of figures and the list of tables is not updated yet but will be after all the changes are consolidated and accepted by the MT).

Next Steps and Agreed Actions:

Action number	Action description	Responsible	Status	Deadline
1	Develop an Annex in which a step-by-step procedure for the reproduction with computer simulations and in test laboratories of the prospective TRV for load current and out-of-phase current switching modified by the capacitors of generator circuit-breakers is described. Develop a set of formulas to calculate the actual TRV parameters depending on capacitors at each side of the GCB for each row of Table 6.	Henk te Paske, Mirko Palazzo	On going	30.11.2017
7	Take actions according to the document "FDIS comments.xlsx", column H	Mirko Palazzo, Matsuki Masashi, Lukas Zehnder	On going	
10	Make a proposal to harmonize the requirements of individual components with those of generator circuit-breakers when part of a system	**Task force leader: Lukas Zehnder** general (Michael) disconnector (Steven, Joachim, Lucas) earthing switch (Steven, Joachim, Lucas) voltage transformer (with or without fuse) (Frank) current transformer (Frank) surge arrester (Frank, Francois) capacitor (Frank) disconnector for SFC (with or without fuse) (Albert, Joachim, Lucas) disconnector for excitation transformer (Mirko) disconnector for unit auxiliary transformer/back-to-back start-up (Albert, Jean-Marc, Frank) short-circuiting connection (permanently mounted) (Lukas) enclosure (Emanuele, Lukas) cable and any other connecting element (Emanuele, Lukas) bushings (Emanuele)	On going	30.11.2017
11	Make a proposal for a guidance note for the selection of generator circuit-breakers in case of power station layouts consisting of two generators connected to one two-winding step-up transformer. Add also the generator circuit-breaker connected at the MV terminals of the step-up transformer.	Lucas Pernitz, Matt, Shawn	On going	30.11.2017
14	Collect requirements for doubly-fed induction machines applications	Mirko Palazzo, Jean-Marc	On going	30.11.2017
15	Collect requirements for wind farm applications (onshore and offshore, DFIMs, PMGs, AGs)	Francois Trichon (TF leader), Leslie Falkingham, Mirko Palazzo, Jim van de Ligt, Albert Livshitz	On going	30.11.2017

19	Check the group vector and connection of windings of step-down transformers in microgrids	Francois Trichon	On going	30.11.2017
22	Update references to IEC 62271-1 and adjust clause numbering system and text where needed		To start	
23	Check if, in case the associated generator circuit-breaker is equipped with capacitors of at least 100 nF/phase installed phase to ground, the time delay td will be longer than 1,0 us for the Tee-OFF circuit-breaker.	Mirko Palazzo	To start	30.11.2017
24	Check the correction factor and procedure for power-frequency and lightning impulse withstand voltage tests and make a proposal to be included in our document	Francois Trichon, Lukas Zehnder	To start	30.11.2017
30	Send any question on wind farm circuit-breakers application to Mirko and make a proposal for the Annex	Mirko, Steve, Leslie	on going	30.11.2017
32	Include the consolidated version of action item #11 into the main document	Mirko Palazzo	on going	30.11.2017
33	Provide a terminology for switchgear to be used in IEC/IEEE 62271-37-013	Steve Meiners	On going	30.11.2017
35	Propose wording to address equipment rather than components only in 6.101.1.2	Lukas Zehnder	On going	30.11.2017
36	find a candidate to check the proposed procedure to evaluate the TRV modified by capacitors	Jean-Marc, Henk, Joachim, Steve	On going	
38	Replace Figure 9 with the one provided by Sergio Flores (black and white)	Mirko	On going	30.11.2017
39	Harmonize the use of test plant, facilities, etc throughout the document	Jim van de Ligt	On going	30.11.2017

Future Meetings and Schedule:

The next meeting will take place either in Villeurbanne, France, or in Bergamo, Italy, on January 30th and 31st, 2018. Details and location information will follow.

Regarding the meetings in North America within the IEEE Switchgear Committee, it has been decided to hold the IEC/IEEE 62271-37-013 meetings on Wednesday, Thursday and Friday to reduce the overlap with other meetings and especially to allow the members of IEC/IEEE 62271-37-013 to attend the meetings of C37.20.2 and C37.20.3 which can be held on Monday and/or Tuesday.

Role	Last name	First name	Initials	IEC NC	Affiliation	Attended October 11th, 2017	Attended October 12th, 2017	Attended October 13th, 2017
Guest	Ashtekar	Koustubh	KA		Eaton		√	
Guest	Cary	Steve	SC_G		GE			
Member	Chen	Steven	SC		Eaton	√	√	√
Guest	Chow	Chih	CC		PEPCO	√		
Guest	Christian	Michael	MC_G		ABB			
Member	Colesanti	Michael	MC		Google	√	√	
Member	Falkingham	Leslie	LF	GB	VIL			
Member	Flores	Sergio	SF		Schneider Electric	√	√	
Member	Frigiere	Denis	DF	FR	GE	√	√	√
Guest	Hartzel	Ron	RDH		Eaton	√		
Member	Jacquier	Frank	FJ	FR	GE	√	√	√
Guest	Leufkens	Paul	PL		PPL	√	√	
Guest	Leccia	Brad	BL		Eaton			
Member	Livshitz	Albert	AL		CE Power	√	√	
Member	Masashi	Matsuki	MM	JP	Mitsubishi			
Member	Meiners	Steven	SM		GE	√	√	√
Member	Morelli	Emanuele	EM	IT	ABB			
Guest	Nayar	Rag	RN		Siemens	√	√	
Member	Oemisch	Joachim	JO	DE	Siemens	√	√	√
Guest	O'Neil	Brian	BO		CE Power			
Chairman	Palazzo	Mirko	MP	CH	ABB		√	√
Member	Pernitz	Lucas	LP	DE	Siemens			
Guest	Reddy	Samala Santosh	SSR		Powell	√	√	
Member	Ricciuti	Anthony	AR		Eaton	√	√	√
Guest	Tailor	Chand	CT		Eaton	√		
Member	te Paske	Henk	HtP	NL	DNVGL	√	√	√
Member	Trichon	Francois	FT	FR	Schneider Electric	√	√	
Member	van de Ligt	Jim	JvdL		CANA High Voltage Ltd	√	√	√
Guest	Wactor	Michael	MW_G		Powell	√		
Guest	Warren	Robert	RW		KEMA			
Member	Webb	John	JW	US	ABB			
Member	Westerdale	Matt	MW		Bureau of Reclamation			
Member	Willieme	Jean-Marc	JMW	FR	GE	√	√	√
Guest	Wisnewski	Joe	JW_G		UL			
Member	Yonce	Larry	LY		Eaton	√		
Member	Zehnder	Lukas	LZ	CH	ABB	√	√	√