MINUTES OF THE MEETING OF THE HVDC CONVERTER TRANSFORMERS & SMOOTHING REACTORS S.C. IN MIAMI, FLORIDA, APRIL 20, 2009

The HVDC Converter Transformers and Smoothing Reactors S.C. met on April 20, 2009 at 1:45 p.m. in the Picasso Meeting Room of the Hilton Miami Downtown Hotel, in Miami, Florida. There were 11 members and 15 guests present. The following are the highlights:

1. Introductions were made.

2. IEEE patent policy was reviewed, and there are no issues re the revision of IEEE 1277.

3. The minutes of the Porto meeting were approved.

   Note: The minutes of the Miami meeting will not be approved until the meeting of the S.C. in Lombard, Illinois.

4. The Chairman briefed S.C. meeting attendees on the highlights of the Administrative SC meeting.

5. The remainder of the meeting focused on discussion of Draft #3 of the revision of IEEE 1277. Consensus of the SC/WG is that the revision of IEEE 1277 is essentially complete. Final details are to be resolved per WG agreement detailed below:

   (i) Specific details re CIGRE publications on oil conductivity are not yet available; Ugo Piovan will provide.

   (ii) If the capacitor discharge test is performed using an impulse generator, the front time may be short vs. if a capacitor bank is used, plus a resistor, and a front time consistent with a switching impulse can be achieved; Clauses 12.5.2.4.2.2 and Clause 129 will be modified.

   (iii) Comments received from Lars-Erik Juhlin, plus responses from Pierre Riffon, were discussed:

   - Clause 5.0.5 “Other Unusual Service Conditions”; i, j and l will be deleted as they are not applicable to SMRs;
   - Clause 6.4.2 “Tolerances”; text from Clause 9.0.1.2 will be added re impact of full rated and SC current;
   - Text and figures in Clause 6.7.3 and Annex A will be co-ordinated. Fig. 1c in Clause 6.7.3 will be changed; eliminate neutral and show a single ground point as in Fig 1 b.
   - Clause 7.2 “Insulating Liquids”; reports of CIGRE working groups referred to in the second NOTE were not published at the time of final draft of this revision. The third NOTE will be expanded. Oil conductivity testing is per IEC 61620 and IEC 60247. The conductivity test is an ac test and test

values may not be directly applicable for HVDC applications, but could be a useful relative reference.

- A footnote will be added to Table 1 “The DC Applied Voltage Test and Polarity Revised Test is not applicable for SMRs if the rated DC voltage is below 15% of the SIWL specified for terminal-to-ground.”
- Lars-Erik Juhlin’s suggestion that information on the impact of overloading on insulation aging be added to Clause D.2 of Annex D was accepted. The Chairman will draft text based on LEJ’s input.
- The reference temperature in Clauses 12.4.9 and 12.4.4.5 is 40˚C.
- Re Clause 12.5.3.2, two test methods are allowed; test each terminal with a LI with other grounded or tie both terminals together and apply the LI to both terminals simultaneously. However since there may be some risk with the two terminals tied due to the possibility that the voltage to ground may be higher than the terminal to ground voltage (traveling waves meet in the middle of the winding), the preferred test method is to test each terminal with the other grounded.

(iv) Comments received from Ulf Radbrandt were discussed:

- Clause 3.4 “terminal to ground” should be used vs. “pole to ground”.
- Clause 6.3.2 “Rated dc overload current”; the NOTE will be augmented to include a reference to Annex D “In Service Overloading of HVDC Smoothing Reactors”. Note that D.1 should be “Introduction”.
- Clause 8.2.5 “Test Sequence” should be divided into sub clauses that clearly differentiate between oil-immersed and dry-type; 8.2.5 “Introduction”, 8.2.5.2 etc.
- Clause 2.6.7.1 “the RIV test should be carried out with ac voltage with a crest value equal to nominal dc voltage +10%. RIV listing with dc has not been done to-date.”

(v) SC members agreed with the Chairman that Draft #3 was essentially a final revision in terms of major objectives. The Chairman stated that based on this and on the above discussions/consensus agreements, he would prepare Draft #4 as soon as possible. The Chairman also requested that SC members review Draft #3 in detail re editorial corrections or any other possible errors or omissions and provide him this input as soon as possible for inclusion in Draft #4. To facilitate the process, it is suggested that the detailed review be broken down into three components; Contents: 1 to 11, Contents: 12 and Contents: Annexes A to G. Draft #4 will be sent to SC members for approval and once obtained; the Chairman will initiate a formal IEEE ballot process.

6. The Chairman thanked the SC members for their contributions to the revision process. The meeting adjourned at 3:00 p.m.

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