



# TRANSFORMER COMMITTEE MEETING MINUTES

## Working Group PC57.91

March 26, 2019

4:45 PM – 6:00 PM

Hilton Anaheim, Anaheim, CA

Meeting Room: California Ballroom A

---

**Chair:** David Wallach

**Vice-Chair:** Javier Arteaga

**Secretary:** Kumar Mani

---

### 1. Introductions

Establishment of quorum- quorum narrowly missed based upon the RFID system roll call- Number of Members in Activity = 73; Number of Members Present = 35; Quorum Present = 47.9% with Number of attendees = 89 at the meeting. The chair mentioned that we may have to review the member list based upon 2 out of three 3 last meetings attended.

### 2. Meeting Agenda Review- was reviewed and not approved due to lack of quorum

### 3. Previous Meeting Minutes Approval Status

- a. Louisville, 2017 Fall – was approved by electronic vote prior to meeting
- b. Pittsburgh, 2018 Spring – still needs approval
- c. Jacksonville, 2018 Fall – still needs approval

### 4. Call for Patents: A call for patents was made and there were none claimed.

### 5. Discussions on Draft Document D2 (circulated before the meeting)

- A. Distribution Transformer loading: This topic is being discussed by the Transformer Efficiency and Loss Evaluation SC under SC Distribution. The chair will continue to maintain contact with Phil Hopkinson for input if made available.
- B. Table 8 Maximum Loading Multiplier (9.2.1)
  - Mickel Saad suggested changing it based upon transformer size like in IEC with an insulation life of 180,000. He and Jeffrey Wright agreed to work on studying the IEC guidelines.
  - Don Platts suggested we make changes to temperature limit tables.
  - Daniel Blaydon mentioned that many utilities may be not be agreeable to doing that.
  - Jeff Wright was inclined to limit maximum loading to less than 200% due

to increased stray flux heating at that load.

- Anastasia O'Malley stated that she was not in favor of changing limits since their 93-300 MVA transformers are designed on that basis.
- Weijun Li mentioned that 200% overloading is used in the operating procedures of many utilities.
- Daniel Blaydon wanted to know why is there reluctance to make changes to the limits.
- Mickel Saad felt that utilities should be specifying a load profile during the overloading conditions in their purchase specifications.
- Thomas Spitzer cited that Texas Utilities had a 150 % limit for overloading large power transformers.
- Shibao Zhang commented that bushings did not have a short time overload rating
- It was decided that Jeff Wright / David Wallach / Mickel Saad will work on a proposal for Table 8.

#### C. Updates to Ancillary Component loading (9.2.2) – Weijun Li

- Weijun commented that we should revise 9.2.2 to state that design reviews should be held to ensure that the ancillary components are selected appropriately to withstand the overloading. It should also be called out in clause 9.7.
- Juan Castellanos felt that the clause 9.2.2 is not meant for the transformer OEMs but rather for the users
- Bruce Forsyth felt that the design review intent is already conveyed in clause 9.2.2.
- Thomas Spitzer felt that the OEM should be responsible to ensure the ancillary component capabilities.
- Amitabh Sarkar felt that the user should specify the overloading requirements in the purchase specification.
- Weijun Li mentioned that the intent was to make the user to take into consideration that the components will not be hot spot during the overloading cycle.
- It was decided to leave the clause 9.2.2 as it was for now.

#### D. Updates to Effect of Loading Above Nameplate – Bushing (B.1.1)– Shibao Zhang

- The temperature limits for overloading C57.19.100-2012 have been removed since bushings have zero overload capability. Based upon this, he proposed revision of Annexure B.1.1 of the guide to let the OEM / User decide the rating of the bushings based upon the specified overload.
- Daniel Blaydon suggested we coordinate changes with the bushing overload TF. Peter Zhao mentioned that the concerned TF is getting ready to conclude its findings. They are working on PD / bubbling of condenser bushings due to overloading.
- Robert Thompson requested that the guide only indicate that the user need to specify the current rating of the bushings.

- Cihangir Sen stated that a number of design factors will change if overloading is specified.

E. Other Updates – A new/updated Abstract and Keywords were proposed by Barrie Kokanos via correspondence with the chair . Barrie was unable to attend but requested to participate with the Working Group.

**Abstract:** The contents of this guide describe the assumptions, techniques and methods for estimating the effects of loading above nameplate of 65 °C rise mineral-oil-immersed power transformers and step voltage regulators. Consequences due to loading above nameplate ratings are discussed including damage to insulation, production of gases in oil, and ultimately loss of life effects. In addition, effects of loading on auxiliary equipment is presented. Different types of loading scenarios as well as variations in ambient temperature and altitude are described. Effects due to different cooling techniques and their impacts on transformer capacity are reviewed. Transformer temperature criteria are also provided. Finally, two calculation methods with and without consideration to duct oil effects are provided and with sample temperature calculations.

**Keywords:** distribution transformer, step-voltage regulators, IEEE C57.91, loss-of-life, short-term overloads, long-term overloads, loading, mineral-oil-immersed, insulation aging, power transformer.

The sub-committee could not discuss this topic for want of time.

A. Differential Equation Presentation in Clause 7 and Annex G – Oleg Roizman made an excellent presentation on the history of this differential equation. He mentioned that there is a Cigre Publication # 659 for thermal modelling. Oleg will work on some suggested wording, perhaps an appendix, to propose at the next meeting. He recommended that a numerical solution today is more appropriate, using finite differences, to reflect better the performance of the transformer.

## 6. Next Meeting

A. October 29, 2019 – Columbus, OH

## 7. Adjournment