

Working Group Meeting

C57.123 Loss Measurement Guide

March 26, 2018;

15.15 – 16.30

Pittsburgh, PA

Chair: Ed teNyenhuis

Secretary: Anthony Franchitti

Agenda

1. Circulation of Attendance Rosters
2. Headcount (for quorum determination)
3. Approval of Agenda
4. Approval of Previous Meeting Minutes
5. Results of PCS Survey on Phase Angle Correction & Loss Bridge Method
6. Update on Assigned tasks from Previous Meeting
 1. Sections 3.1 to 3.5.2 to be reviewed by Ramsis Girgis
 2. Section 3.5.3 to by Bertrand Poulin
 3. Section 4.5.4 to be also reviewed by Eddy So
 4. Section 5 to be reviewed by Eddy So
 5. Section 6 to be reviewed by Ramsis Girgis
 6. Section 7 – discuss who can review this
 7. Section 8 to be reviewed by Tauhid Ansari and Andy Steineman
 8. Bibliography to be reviewed by Eddy So and Bertrand Poulin
7. Review of draft document
8. New Business

Members

- Anthony Franchitti
- Tauhid Ansari
- Andy Steineman
- Ramsis Girgis
- Ajith Varghese
- Ed teNyenhuis

Survey

- Could you please advise in your experience if the below could be removed:
 - Load Loss Phase Angle Correction of Load Loss Measurement (Section 4.4.1)
 - Bridge Method for Load Loss Measurement (Section 4.5.4)

Results of Survey (to Remove)

Load Loss Phase Angle Correction of Load Loss Measurement (Section 4.4.1)

Bridge Method for Load Loss Measurement (Section 4.5.4)

4.4.1	4.5.4	Name	Comment
No	Yes	Demy Bucaneg	There are already several simpler methods than using this complex Bridge process
No	Yes	Bruce Forsyth	
No	No	Kiran Vedante	Maybe move to Annex, It can be moved to Annex. In some places this method is still being used.
No	No	Daniel Sauer	It applies to the CT & VT as well as the meters and these devices still have this type of error, regardless of how advanced or digitally enhanced the meter may be The Bridge method is a classic and if it is to be removed should be placed in an appendix.
No	Yes	Vladimir Khalin	It serves as educational purpose. Many users think that VTs and CTs with metering accuracy Class 0.3 may serve purpose without any correction
Yes	Yes	Waldemar Ziomek	
Yes	Yes	k vijayan	
No	No	Bertand Poulin	This document being a guide and not a standard, I propose to keep the sections, but rearrange the document to further enhance the section on advanced measuring systems commonly used today and more or less only mention the existence of Phase Angle Correction and Bridge Methods
Yes	Yes	Gregorio Lobo	
Yes	Yes	Rhea Montpool	
Yes	Yes	Jim Antweiler	
Yes	Yes	Eduardo Garcia	
No	No	Mathieu Sauzay	
Yes	Yes	Dev Walia	

Eddy So Comments

- Section 4.4.1 – is phase angle correction still used anymore? **Yes, there are still transformer manufacturers that make use of conventional instrument transformers that would require phase angle corrections to reduce their loss measurements uncertainties. Would require a rewrite.**
- • Section 4.5.4 – is the bridge method still used anymore? **Yes. Would require a rewrite.**

Draft Work

- Sections 3.1 to 3.5.2 to be reviewed by Ramsis Girgis
- Section 3.5.3 to by Bertrand Poulin
- Section 4.5.4 to be also reviewed by Eddy So
- Section 5 to be reviewed by Eddy So
- Section 6 to be reviewed by Ramsis Girgis
- Section 7 – discuss who can review this
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Sections 3.1 to 3.5.2 to be reviewed by Ramsis Girgis

- See word file

Mark Perkins - 3.5.3

In order to reduce the distortion in the voltage waveform or to provide a higher voltage than might otherwise be obtained, capacitors may be used in parallel with the voltage source. Capacitors provide power factor correction as well as smoothing of the voltage wave by supplying the harmonic currents. Caution should be exercised in the used of capacitors for several reasons.

- a. If a generator is used to supply the voltage, capacitors can cause self-excitation and a resulting overvoltage of the generator and transformer.
- b. The high harmonic content of the no-load current can cause high currents in the capacitor. This may lead to overheating of the capacitors or the blowing of capacitor fuses. To avoid this it may be necessary to operate the capacitors at significantly reduce voltage to compensate for this.

Mark Perkins - 3.5.3

- c. Since the inductive current component of the no-load loss current increases at a higher than proportional rate with the voltage, the source current may actually decrease while the voltage is being raised as the power factor of the load moves from highly capacitive to the tuned point. When a variable voltage, variable frequency source is used, this problem may be alleviated by starting at reduced voltage and a lower frequency and then stair stepping the voltage and frequency up as the voltage is raised. The reverse process is then used for lowering the voltage to prevent overloading the source.
- d. When large capacitors are used with the source, the average voltage may be higher than the rms voltage, meaning that the voltage waveform is flat topped like a square.

Mark Perkins – 4.4.4.2 & 4.5.4

- 2. Recommendation for 4.4.4.2
- It is recommended to measure the loss in the guarantee position first to minimize errors due to the cumulative effect of performing measurements at multiple tap positions or levels.
- 3. Recommendation for 4.5.4 Bridge Method
- The bridge method can produce highly accurate loss measurements, but in recent years has generally only been used for testing very low power factor single phase loads, such as shunt reactors or for calibration purposes. As such it is not generally used for routine transformer testing.

Eddy So

- Section 5 – Maybe this is not “modern” anymore so can you review and add any new technologies we should include. **Would require a rewrite.**
- Section 7 and 8 **would require a rewrite.**
- Bibliography – do you have any more recent references we can add? **Would need to be updated.**
- **Hopefully, I would have time to work on the updates for the Fall meeting.**

Bibliography Review – Bertrand P.

4.4.4.2 Duration of the load-loss measurement test

During load-loss measurement, the current in the winding increases winding temperature and hence increases winding I^2R losses. To minimize the magnitude of this effect, it is the manufacturer's responsibility to keep the test time as short as possible. **If several measurements of losses and impedance are required, maybe measurements at different tap positions, it is advisable to perform the most critical measurements like the guaranteed losses first at rated current and next perform the extra required measurements at reduce currents to minimize errors due to winding temperature increase.**

- 4.5.3

Temperature correction shall be made as in 9.4.2 of IEEE Std C57.12.90 and 9.4.1 of IEEE Std C57.12.91.

Note: There may be cases where the middle leg of a three-phase transformer cannot be energized in single phase mode under short-circuit condition. In such a case, this method is not applicable.