



Electricity and Magnetism Metrology Working Group

2016 SIM EM MWG Meeting
Saturday, July 16th, 09:00 h – 13:30 h
Quebec Room - Executive Level
The Westin Ottawa, 11 Colonel By Drive Ottawa, Ontario K1N 9H4, Canada

1. Participants

| Name | NMI | Country | E-mail |
|-----------------------------|----------|---------------|--|
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| Lucas Di Lillo | INTI | ARgentina | ldili@inti.gob.ar |

2. Introduction

Welcome and introduction of the participants.

The meeting commenced at 9:00 am with a welcome by the chairman followed by self introductions of the attendees from the various countries represented.

The agenda was approved by all participants.

Randolph Elmquist volunteered to take the minutes of the meeting.



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3. SIM/IAAC/COPANT Energy Project

This project is now in phase 2, which runs through 2019.

The Working Group was informed by G. Kyriazis on its status. He suggested that since the project concerns testing needs for consumer appliances, commercial testing labs need to be involved. In the presentation the following issues were brought up:

NRC training event, to be held July 17-19 at the main NRC campus;

Suggestions for new topics were requested;

Lucas Di Lillo mentioned that care is needed in activity selection to maximize benefits and suggested to write a roadmap with some actions and activities to support this roadmap.

4. COMPARISONS

a. SIM Pilot Study on Two-Channel Harmonic Voltages in 10-V Range

G. Kyriazis presented a model for a pilot study for the planned SIM comparison on harmonics. SIM.EM-K13. The following points were discussed:

The comparison is intended for participating labs that utilize two-channel sampling systems. The main idea is to distribute and executable software that must be supplied to make the required measurements. The pilot Laboratory of this pilot study will be INMETR and all the analysis data will be done by pilot lab (INMETRO);

CENAMEP Panama provided results for the pilot study, presented in a poster at CPEM-2016;

The pilot study showed that synchronized sampling should give improved results.

Rene Carranza (CENAM) described application for digital signal processing for power frequency. Issues dealing with data acquisition were pointed out. He also mentioned that will be more useful for the whole region a comparison in transducers to be used in power system.

Gregory replied that the assumed sampling parameters of the software will be supplied so that each lab can optimize their data acquisition. The purpose is to discover problems with user systems, and no formal report of the results is planned at this time.

ACTION ITEM: The Chair will send an email to all members of the SIM Group Chair asking which NMIs wants to participate. Decision must be taken in one month.

CENAMEP would like to participate and CENAM decided not to participate, INMETRO possibly.

b. SIM.EM-S8. INSTRUMENT CURRENT TRANSFORMERS

Alejandro Santos from UTE presented SIM.EM-S8. INSTRUMENT CURRENT TRANSFORMERS

This comparison began in June, 2013. Transportation between UTE and INMETRO was slow, resulting in 11/2013 receipt of the traveling standards. Other



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issues with customs occurred in 2015 in Mexico with a penalty assessed by customs for exceeding the expected time of return. The participant in Mexico was a designated commercial laboratory. The Chair suggested that in future comparisons, when a non-NMI is a participant they should go last so as to avoid similar problems and possible delay. The experience provided a good experience in learning to work in such a way as to anticipate such issues and to work to avoid problems with customs. The participants should agree beforehand what to do if there is a delay that might cause problem with customs. Presently the traveling standards are in UTE and will be sent to INTI. After INTI makes the measurements the travel standard will go to PTB and UTE for the final measurements.

c. SIM.EM-K12

Lucas Di Lillo (INTI) presented the current status of the comparison. Comparison included NRC, NIST, CENAM, and INTI. External participants were KRISS and NPLI India. Late submission of results from some NMIs delayed the completion, and no results were obtained from KRISS. Draft B reports version 1 and version 2 have been submitted to BIPM. Some results were shown, with good Degrees of Equivalence (DOEs) obtained between the five labs that submitted results.

d. SIM.EM K3 inductance comparison

SIM.EM K3 inductance comparison was presented by A. Moreno (CENAM). This comparison was completed in total 3 years, 7 months. Heavy shipping container was used to reduce shock in transport. Some characteristics were measured to determine the temperature dependence of inductance and resistance for each traveling standard and the long term behavior also was measured. The provided temperature-controlled enclosure made the inductance more stable. Three loops were set up (NIST and NRC), (INTI and INMETRO), (ICE and UTE) and after each loop the standards were returned to CENAM for additional measurements. One standard shifted in transport between CENAM and INTI, and the results for this standard (L6) were discarded. Draft A was prepared and approved after comments from the participants and draft B was approved with no comments from CCEM. The DOEs were within the reported uncertainties, and CENAM, NIST, INTI, INMETRO, ICE, and UTE all declared compliance with their existing CMC uncertainties.

5. NEW AND PROPOSED COMPARISONS

a. DMM comparison

Isabel Castro (ICE) presented a proposed DMM-based comparison of voltage, current, and resistance to start in 2016 or 2017. SIM has 6 (six) DMMs and ICE has two of them so ICE can supply the instruments for the comparison. The



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number of DMM to be use will depend on how much NMIs wants to participate in the comparison and if there will be one or two loops with different instruments. The likelihood of a link to a CCEM comparison is not yet known. NRC and NIST have not yet indicated if they will participate. INTI indicates that can put the reference value of the comparison. A draft protocol will be circulated and participants should return comments.

ACTION ITEM: Lucas Di Lillo will ask NMIs representatives for direct contact information for each comparison at the participating labs. All SIM members agreed. The group also agreed that sharing of responsibility for comparison duties (analysis, customs, etc) is needed for this and future comparisons.

b. SIM.EM K13 Harmonics comparison

The SIM.EM K13 harmonics comparison will be done after the CCEM K13, which is piloted by NIM China. This covers non-sinusoidal waveform power measurements. CCEM has concerns about workload, and may reduce the scope or number of the test points. R. Carranza (CENAM) suggested that SIM should wait for CCEM to decide on the test waveforms. Rene Carranza also suggested a pilot study between CENAM and some other lab to resolve issues (July 2017), and the organization of a workshop (Nov 2017) to discuss the protocol and other issues. A suitable NRC waveform including voltage and current data is a possibility. INMETRO, CENAM, and NIST also will participate in CCEM K5 and this must be considered in setting up the protocol.

c. CCEM K6 and K9, AC-DC voltage transfer difference

Lucas Di Lillo (INTI) described plans for CCEM K6 and K9, AC-DC, from the most recent CCEM meeting.

K6a: 1V to 4 V, 10 Hz to 1 MHz.

K9: 500 V and 1000 V, 10 Hz to 100 kHz.

CCEM is trying to reduce the number of participants in order to speed up key comparisons and SIM will wait for that decision to see which SIM NMIs will be included in that before proceeding with the comparison protocol development.

d. Comparison on low Value resistors

Rene Carranza (CEMAN) informed that the low value measurement resistor system of CENAM is broken. For this reason, CENAM cannot start the comparison right now. CENAM hopes that by the end of this year the measurement system will be repaired so they will inform about this comparison by January 2017



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6. SIM and Interregional CMC Reviews

The Chair reported difficulties with the COOMET interregional review of SIM.EM 8 (2015), resulting in delays of approval.

7. TC MEETING

Lucas Di Lillo (INTI) mentioned that sometimes he has several problems in order to have an answer from the reviewers. He also mentioned the importance of the revision so SIM reviewers who have agreed to be responsible for review in a technical area must answer emails when requested to make the review.

Also, Lucas Di Lillo indicates that the SIM WG representative must be clearly defined by each NMI. Presently the email list includes several people from each NMI, and the number of names must be reduced. The head of the division or section and the designated WG representative should be the only people on the mailing list and the WG representative should ensure that the proper reviewers or technical areas are informed as required.

R. Ramos (LCPN-ME) suggested that the review of CMCs would proceed more smoothly if a platform for exchange of comments were selected and agreed upon. Google Drive was suggested and used by the WG in some revisions but Lucas Di Lillo said that access to that platform was not uniform. The most pressing need is to stop sending Excel files and use a single file common to all reviewers.

NIST and NRC have made formatting modifications to their CMCs that will reduce the number of lines. NIST eliminated about 20% of the lines and added three matrices. Lucas Di Lillo asked the WG for the authority to approve the modifications when they are mainly formatting changes and do not involve a reduction in uncertainties or new entries. This was agreed.

How to present CMCs: CIPM requirements were reviewed by Lucas Di Lillo. Submissions must include a formal Quality System review declaration.

Possible improvements in the MRA are under review. The CCEM needs to resolve what type of CMCs should be included. Many members prefer that CMCs not be included for every NMI level of service, only for the top level. Comparisons are not required to support CMCs but evidence of capabilities should be present.

8. NEXT SIM EM MWG MEETING

The location of the next WG meeting will be the same as the SEMETRO conference, but that has not yet been decided.