



## 1. General Aspects

In 2015, Luca Callegaro and Paul Wright took over Francois Piquemal and Gert Rietveld as TC Chair and SC-Power and Energy convenors respectively. The TC-EM was well occupied with routine affairs for MRA (comparisons and CMC review).

## 2. Projects

Detailed information about the EURAMET projects in the EM field is available from the EURAMET web-site and currently updated. An overview of the number of projects is given in the table below.

	<b>EURAMET Comparison</b>	<b>Traceability</b>	<b>Research</b>	<b>EMRP</b>
<b>On-going</b>	<b>14</b>	<b>12</b>	<b>1</b>	<b>16</b>

The Guide no. 9 “Measurement/generation of small AC voltage with IVDs” was considered outdated and removed from EURAMET website.

The revision of the Guide n. 15 “Calibration of digital multimeters” was published and is available.

## 3. Comparisons

During 2015, one supplementary EURAMET comparisons and one comparison not registered in the BIPM-KCDB have been completed in the EM field. Besides this, EURAMET is or has been active in a large number of CCEM comparisons.

This year 2015 has seen significant progress in the development of the comparison toolbox initiated in 2012 with the aim at improving the comparison process (shortened duration, more labs in capability to be pilot ...) thanks to the involvement of Jürgen Melcher from PTB who has accepted to chair this task force. A web platform for comparison management has been set up and is being tested.

## 4. CMCs

### 04.1 EURAMET EM CMCs

**04.1.1 EURAMET.EM.12.2014.** The run for CMCs set EURAMET.EM.12.2014 was launched in October 2013 was published on the JCRB website on 26 January 2015.

**04.1.2 EURAMET.EM.13.2015.** The new run for CMCs EURAMET.EM.13.2015 was launched on 1<sup>st</sup> February 2015 with a deadline for submission of 30 April 2015.

#### Intra RMO review

The intra-RMO review of the CMC set EURAMET.EM.13.2015 was carried out between May and August 2015.

14 NMIs submitted in total 241 entries, details can be seen in Tab. 1. Of these, 37 are new entries, together with 53 matrices. 130 are improved existing entries, together with 50 matrices. For 44 rows and 2 matrices, minor changes were proposed: the scope was reduced, the uncertainty was increased or editorial modifications were applied. 30 entries are announced for removal from the KCDB.

All the entries were reviewed by the members of the working group on the analysis of CMCs.

The outcome of the reviewing is that 124 new or modified entries were approved, and 34 entries editorial changes needed were approved. 12 submitted entries were not approved and 31 entries will have to be definitively deleted from the KCDB.

The 124 new or modified entries were submitted to the inter-RMO review for approval. No technical review was necessary for the entries asked for minor changes (the corresponding lines are hidden in the files submitted for inter-RMO review).

#### Inter RMO review

The set EURAMET.EM.13.2015 was posted on the JCRB website on 2015.08.31. Three RMOs (AFRIMETS, APMP, SIM) decided to review the entries. The review was carried out according to the following scheduling:

	AFRIMETS	APMP	COOMET	EURAMET	GULFMET	SIM
Will review?	Yes	Yes		N/A	-	Yes
Date for review	2015-10-30	2016-02-15		N/A	-	2015-12-30
Date report received	2015-10-28	2016-02-17	N/A	N/A	N/A	2015-12-28

The post-revised CMC files for EURAMET.EM.13.2015 have been uploaded on 2016.04.04

#### Publication

The post-revised files of EURAMET.EM.13.2015 were published on the JCRB website on 2016.04.21.

### **04.1.3 EURAMET.EM.14.2016**

The new run for CMCs EURAMET.EM.14.2016 was launched on 2016.04.29 with a deadline for submission of 2016.06.10.

## **04.2 Inter-regional review of CMCs**

In 2015, EURAMET TCEM was involved in three inter-RMO reviews, concerning the CMC sets

### **COOMET.EM.7.2014**

Posted on the JCRB web site on 29 September 2014. In agreement with the other RMOs, it has been decided to share the inter-RMO review of this set between AFRIMETS and EURAMET (in total 63 entries and two matrices). The EURAMET part of the review was completed in December 2014 but has been extended until end of February 2015, EURAMET being asked to review CMCs which were not reviewed by AFRIMETS by lack of expertise in the considered field.



### **SIM.EM.8.2015**

The CMC set SIM.EM.8.2015 was posted for interregional review on the CMC web site of the JCRB on 2015.10.23. In agreement with the other RMOs, it has been decided to share the inter-RMO review of the set between EURAMET and COOMET. EURAMET reviewed Categories 1 to 6 of all three submitting countries: Costa Rica (CR), Brazil (BR), Chile (CH). 61 entries were submitted for reviewing.

The complete revised set of the CMCs together with the comments of the reviewers has been uploaded on the JCRB Server on 2016.01.17.

### **APMP.EM.10.2015:**

posted for interregional review on the CMC web site of the JCRB on 2015.12.23. In agreement with the other RMOs, it has been decided to share the inter-RMO review of the set between EURAMET, COOMET and SIM.

EURAMET reviewed Categories 5 to 9 of the submitting countries: Australia (NMIA), China (NIM), Indonesia (KIM-LIPI), Japan (NMIJ-AIST and JEMIC), New Zealand (MSL), Thailand (NIMT), Taiwan (CMS/ITRI). 60 entries were submitted for reviewing on these categories.

The complete revised set of the CMCs together with the comments of the reviewers has been uploaded on the JCRB Server on 2016.03.23.

## **5. Activities of the Subcommittees**

The activities of the four subcommittees (DCQM-„DC and Quantum Metrology“, LF-„Low frequency“, PE-„Power and energy“, RFMW-„Radiofrequency and microwave“ are largely dominated by R&D activities related to EMRP and EMPIR.

In 2015, the following SC meetings were held:

SC-DC&QM Contact Person Meeting, at METAS, Bern, Switzerland, 27-28 May 2015, together with a dissemination event of the Qu-Amp project;

SC-LF in SP, Boras, Sweden, 21-22 May 2015.

SC RF&MW in UME, Istanbul, Turkey, 21-22 May 2015.

The EURAMET Workshop on Calculable capacitors and AC impedance bridges took place *took place at* LNE, Paris, on 4 and 5 March 2015. The meeting was attended by 50 participants.

## **6. Participation in EMRP/ EMPIR**

### **2015 Call**

A workshop was held on 27-28 January 2015 at PTB in Braunschweig (gathering around 40 attendees) to prepare PRTs for the 2015 EMPIR calls. A summary of the selected SRTs and JRP's follows:

TP	SRT	JRP ranked	JRP label, SRT title
HLT	h14	no	Metrology for personalised MRI safety concepts suitable for patients with metallic implants
SIB	s01	15SIB06	NanoMAG Nano-scale traceable magnetic field measurements
SIB	s02	15SIB04	QuADC Waveform metrology based on spectrally pure Josephson voltages
SIB	s03	no	Metrology for electrical scanning probe microscopy
SIB	s04	15SIB08	Quantum realisation of the SI ampere
SIB	s05	no	Quantum impedance metrology based on graphene
SIB	s06	no (not presented)	Metrology for terahertz technologies (JRP not presented)
RPT	r06	15RPT01	RFMicrowave
RPT	r01	15RPT04	TracePQM
NRM	n11	15NRM02	UHV
NRM	n12	15NRM04	ROCOF
NRM	n01	no	GraphMECA

## 2016 Call

A workshop was held on 21-22 January 2016 in VSL, Delft, The Netherlands, to prepare PRTs for the 2016 EMPIR calls.

PRTs identified during the workshop are given in the table below:

Call	Provisional Title	Coordinator for PRT preparation
ENG	Smart Grids 3	P. Wright (NPL), G. Rietveld (VSL)
ENG	Future Grids 2	E. Mohns (PTB)
ENG/NRM	Network component losses and efficiency	Acanski (VSL)
ENG	Monitoring power infrastructure	Kleine-Ostmann (PTB)
ENG	HV Grids	Elg (SP)
ENG	Metrology for smart energy management in railway systems	Giordano (INRIM)
NRM	Power Transformers	Turner (NPL)
ENG	Metrology for low power devices	Ziadé (LNE)
ENG	Metrology for Energy storage for electrical grids	Funck (PTB)
ENG	Inductive charging of electric vehicles	Zucca (INRIM)
ENG	RF power transportation	Allal (LNE)
NRM	Metrology for reliability of EMC measurements	Ziadé (LNE)
ENV	Characterisation of the electrosmog	Pythoud (METAS)
NRM	Multiprobe and time domain SAR measurement systems	Abaz (LNE)
NRM	PIMP and corona effect	Sanchez Mirò, Garcia Patron (INTA)

## 7. Capacity Building: Activities of the last year and future needs

### 8. Meetings

The 9<sup>th</sup> EURAMET Electricity and Magnetism Technical Committee Contact Persons Meeting was held in Sarajevo, Bosnia-Herzegovina, on October 15 and 16, 2015. The local Organizer was IMBIH.

29 people representing 23 EURAMET members, one person from BIPM, one person from EURAMET attended it.

A summary of the agenda is the following:

- 01 Confirmation of the agenda; Minutes of the 2014 meeting in Ljubljana; Annual report 2014/2015
- 02 Information: News from EURAMET; News from JCRB and BIPM
- 03 New developments in the subcommittees: DC&QM, LF, P&E, RF&MW
- 04 Cooperation/Traceability/Consultation/Research: Review of ongoing projects; Consultation projects; Proposals for new projects
- 05 Comparisons: Review of ongoing comparisons; Proposals for new comparisons; Comparisons toolbox
- 06 Technical talks: Presentation of IMBIH Laboratory for Electrical Quantities and Time and Frequency; The Revision of EURAMET guide cg-12
- 07 The EURAMET Workshop on Calculable capacitors and AC impedance bridges, LNE, 4-5.03.2015

- 08 Lab news; Poster session
- 09 CMCs: status of EURAMET.EM.13.2015; CMC inter-RMO review in 2015; EURAMET CMC Review group update
- 10 EMRP/EMPIR: status, announcement of future meetings, EMPIR WorkPlan 2015-16; EMPIR 2016 Energy and Pre- and co-normative calls; Capacity building in EURAMET
- 11 Date and place of the next meeting: 13.14 october 2016, Bundesamt für Eich-und Vermessungswesen (BEV), Vienna, Austria.

## 9. Issues

The Convenors for the TC-EM Subcommittees DC&QM, LF, RF&MW (JT Janssen, J. Melcher, M. Zeier) end their third two-year period of appointment.

Elections to propose new Convenors to EURAMET for appointments are under way. A ballot by email started on 2016.05.07 with a deadline for 2016.05.29.

The candidates for the elections are:

DCQM: Antti Manninen, MIKES; Hansjoerg Scherer, PTB.

LF: Damir Ilic, Croatia, HMI/FER-PEL; Helge Malmbeek, JV; Oliver Power, NSAI NML.

RF&MW: Djamel Allal, LNE; Faisal Mubarak, VSL; Andrew Smith, NPL.

## 10. Strategic Planning

Strategic Planning will be addressed at the next WGSP meetings (see below) and discussed at the next TC-EM meeting.

## 11. Outlook for 2016/2017

**CPEM 2016.** The Conference on Precision Electromagnetic Measurements will take place in Ottawa, Canada, July 10-15 2016. Several satellite meetings relevant for TC-EM are already scheduled:

CCEM WG on the electrical methods to monitor the stability of the kilogram

CCEM WG on RadioFrequency quantities (GT-RF)

SC-Power and Energy experts meeting (informal)

SC-Low Frequency experts meeting (informal)

SC-DC and Quantum Metrology experts meeting (informal)

WGSP meeting (informal) devoted to the EMPIR 2017 call

**WGSP meeting** is scheduled for 12 October 2016, Wien, Austria, hosted by BEV (Wolfgang Waldmann).

**TC-EM Contact Person Meeting** is scheduled for 13 and 14 October 2016, Wien, Austria, hosted by BEV (Wolfgang Waldmann).

**TC-EM EMPIR 2017** meeting will take place in January.

