

**G15.05.01**

## **Overview of TC Activities and Main Developments**

**Julien Vuillemin-Toledo**  
Member Service Manager

**Miruna Dobre**  
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15<sup>th</sup> EURAMET GA, Plenary Session  
Online Meeting, 8<sup>th</sup> – 9<sup>th</sup> June 2021

### ➤ **BIPM**

Overall developments & related CIPM MRA matters

### ➤ **EURAMET TC Activities**

- TC Chairs
- Overview of activities
- Comparisons (running, silent, ... & further improvements)
- CMCs (review, Validity and vitality of published CMCs)
- Strategic developments with EMNs (R&D & T)

### ➤ **Calibration and Technical Guides**

### ➤ **TC-IM Transverse developments (Digitalisation, Training, ...)**

### ➤ **Capacity Building (➔ G15.05.02)**

### Dynamic meetings with effective working sessions

43<sup>rd</sup> (March 2021) ... offering good progress on actions initiated in 2019 (40<sup>th</sup>, ...)

- *Report on actions of BIPM, CIPM, KCDB (KCDB 2.0)*
- *RMO reports: all RMOs impacted by COVID-19 & able to adjust (well)*
- *Quality management and CIPM MRA developments*
- *Digitalisation in Metrology (r)evolution, ...*

- Task Group (TG) to report on requirements & associated process related to **JCRB actions to establish confidence in each RMO QS review process** at 43<sup>rd</sup> JCRB with consolidated proposal to vote on at 44<sup>th</sup> JCRB meeting.  
➔ **Action 43/4**
- JCRB allowed the RMOs to **extend the validity of RMO-approved quality management systems for one year to develop sufficient confidence in reviews** carried out online, in person or a combination of both ... with a **deadline reconsidered at 44<sup>th</sup> JCRB meeting.** ➔ **Resolution 43/1**

- **CIPM MRA guidance documents (G-1X series)** consolidated, agreed by correspondence and published in January 2021. → **reviewed EURAMET Guide 4 on Comparisons for approval + initiate review of EURAMET Guide 3 on CMCs**

<b>P-11</b> Overview and Implementation of the CIPM MRA CIPM MRA-G-01 Guide to the implementation of the CIPM MRA CIPM MRA-D-02 Use of the CIPM MRA logo and certificates statement CIPM/2005-05-Rev2012 Associates States and Economies of the CIPM participation in the CIPM MRA CIPM/2005-06-Rev2013 The CIPM MRA: 2005 Interpretation Document CIPM/2009-24 Traceability in the CIPM MRA	<b>P-12</b> Coordination within the CIPM MRA: JCRB, RMOs, CCs CIPM MRA-G-01 Guide to the implementation of the CIPM MRA CIPM MRA-D-02 Use of the CIPM MRA logo and certificates statement CIPM/2005-05-Rev2012 Associates States and Economies of the CIPM participation in the CIPM MRA CIPM/2005-06-Rev2013 The CIPM MRA: 2005 Interpretation Document CIPM/2009-24 Traceability in the CIPM MRA	<b>P-13</b> Participation in the CIPM MRA: NMIs, DIs, IGOs CIPM MRA-D-06 Designated Institutes participating in the CIPM MRA: Expectations and nomination form CIPM MRA-G-03 Guidelines for the review of Quality Systems operated and/or designated Institutes, and the review of their calibration and capabilities (CMCs) (partly) CIPM/2005-09 Subcontracting of measurements under the CIPM MRA
<b>G-11</b> Measurement comparisons in the CIPM MRA: Guidelines for Organizing, Participating, and Reporting CIPM MRA-D-05 Measurement comparisons in the CIPM MRA CIPM MRA-G-04 CIPM MRA Guidelines for Authorship of Key, Supplementary and Pilot Study Comparison Reports Form on Publication of a Final Report in Metrologia's Technical Supplement Key and supplementary comparison registration and progress form	<b>G-12</b> JCRB guidelines for the monitoring and reporting of the operation of quality systems by RMOs CIPM MRA-G-02 JCRB guidelines for the monitoring and reporting of quality systems by RMOs CIPM MRA-G-03 Guidelines for the review of Quality Systems operated by IGO Institutes and/or designated Institutes CIPM/2007-25 Recommendations for on-site visits by peers and for on-site visit peer reviewers	<b>G-13</b> CMCs in the context of the CIPM MRA: Guidelines for their review, acceptance, and maintenance CIPM MRA-D-04 Calibration and Measurement Capabilities in the context of the CIPM MRA CIPM MRA-G-03 Guidelines for the review of Quality Systems operated by IGO Institutes and/or designated Institutes, and the review of their calibration and capabilities (CMCs) (partly) CIPM/2007-11 Calibration and measurement working group JCRB-8/9 Uncertainty contributions of the calibration or measurement device under

- TG to initiate **review of statistical criteria** in guidance document **CIPM MRA-G-11 (on comparisons)**, report and propose recommendations at 43<sup>rd</sup> JCRB with a **consolidated proposal at 44<sup>th</sup> JCRB meeting** → Action 43/3 → **involving TCs and EMN MathMET**
- **JCRB CMC website shall close for all users except “tcguests”**. Upon closure, the JCRB CMC website will remain available but not linked from the BIPM website. → **Action 43/5**
- RMOs shall work with their TCs to **review the status of RMO KCs & SCs** that have not been completed in 5 years ... → **ongoing progress**

## Key aspects and Benefits

- Combining onto a **single web platform** the capabilities of
  - JCRB **CMCs**' review area
  - KCDB (1.0) **comparisons**' platform
- **Extended web functionalities**
  - Improved search facilities
  - *Ad-hoc* statistics
  - Support in submitting CMCs/Comparisons via webforms
  - Individual submission of CMCs (vs. batches)
  - **Automated web circuit for CMC submission** ... review by TC-C / RMOs ... subsequent JCRB approval ... and final open access publication on the KCDB web
  - **Automated reminders (for better comparison management and progress)**
  - *Etc.*

## ***Implementation***

- + KCDB 2.0 fully operational since October 2019**
- + over 1200 external user accounts created**
- + over 4000 CMCs (from draft to approval) published**
- + over 78 new comparisons registered by Pilots**
  
- **Migrations issues** (broken links to RMOs comparisons databases / missing / wrongly defined CMC categories)
- **Some delays in CMC / comparison publications** (largely absorbed)
- **Major change in practices** (for former users and new users ... **calling for further training and practice**)

## **Support & Training with CBKT**

- **KCDB 2.0 training portal** (<http://kcdb-cbkt.bipm.org/kcdb/>) with guides, PPTs and videos
- **Training courses**
  - Optimizing the CIPM MRA - the KCDB 2.0, BIPM, 4-8 Nov. 2019
  - 2020 BIPM-EURAMET Workshop: "the KCDB 2.0", BIPM, 17-19 Feb. 2020
  - 2020 BIPM-RMO Workshops on KCDB 2.0 on **General Physics** 3 Sept. 2020 & **IR** 10 Sept. 2020
  - **Joint TC-T / COOMET / BIPM training session on comparisons** 26<sup>th</sup> April 2021
  - Online technical exchanges on **comparisons**, held on **3<sup>rd</sup> February 2021** and **15<sup>th</sup> June 2021**
  - **Further training for both CMCs and Comparisons related activities**
- **Ad-hoc** support ([Susanne Picard](#) & [Chingis Kuanbayev](#)) → **ad-hoc** meetings, workshops, etc.

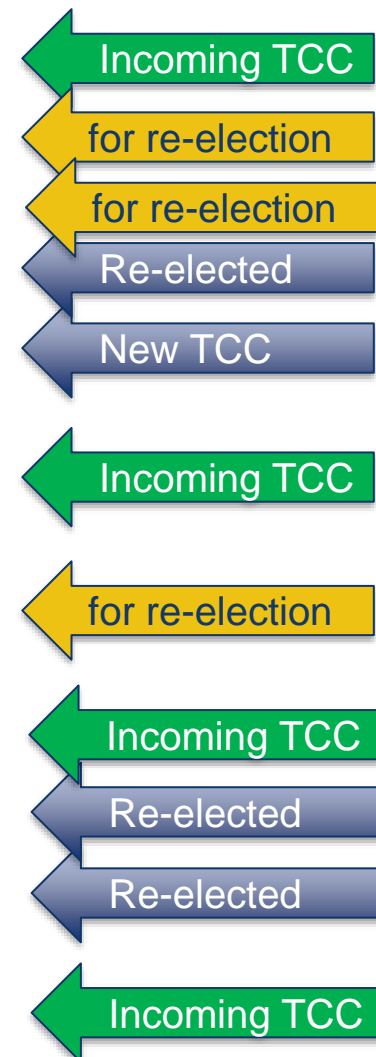


# EURAMET Technical Committees

## TC Chairs until GA 2021



TC	TC-Chair	Institute	Country
<b>AUV</b>	Robinson, Stephen	NPL	United Kingdom
	Sadikoglu, Enver	Tubitak - UME	Turkey
<b>EM</b>	Zeier, Markus	METAS	Switzerland
<b>F</b>	Care, Isabelle	LNE-CETIAT	France
<b>IM</b>	Dobre, Miruna	SMD	Belgium
<b>IR</b>	de Pooter, Jacco	VSL	Netherlands
<b>L</b>	Prieto, Emilio	CEM	Spain
	Bergstrand, Sten	RISE	Sweden
<b>M</b>	Arrhén, Fredrik	RISE	Sweden
<b>MC</b>	Vaslin-Reimann, Sophie	LNE	France
<b>PR</b>	Kück, Stefan	PTB	Germany
	Campos Acosta Joaquin	IO-CISC	Spain
<b>Q</b>	Stoll-Malke, Kai	PTB	Germany
<b>T</b>	Del Campo, Dolores	CEM	Spain
<b>TF</b>	Whibberley, Peter	NPL	United Kingdom
	Achkar, Joseph	SYRTE-LNE	France



# EURAMET Technical Committees

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<b>AUV</b>	Sadikoglu, Enver	Tubitak - UME	Turkey
<b>EM</b>	Zeier, Markus	METAS	Switzerland
<b>F</b>	Care, Isabelle	LNE-CETIAT	France
<b>IM</b>	Dobre, Miruna	SMD	Belgium
<b>IR</b>	de Pooter, Jacco	VSL	Netherlands
<b>L</b>	Bergstrand, Sten	RISE	Sweden
<b>M</b>	Zelenka, Zoltan	BEV	Austria
<b>MC</b>	Vaslin-Reimann, Sophie	LNE	France
<b>PR</b>	Campos Acosta Joaquin	IO-CISC	Spain
<b>Q</b>	Stoll-Malke, Kai	PTB	Germany
<b>T</b>	Del Campo, Dolores	CEM	Spain
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New TCC

Re-elected

Re-elected

New TCC

New TCC

Re-elected

New TCC

New TCC

# Overview

## TC Activities despite COVID-19



- **Good adaptation**
  - TC-annual meetings postponed and re-organised online
  - Some activities initially slowed down (Comparisons, strategic planning / roadmaps, CMC reviews )
  - Few events / Most trainings cancelled
- **Good activity level, as from 3<sup>rd</sup> Quarter 2020 → business nearly as usual**
  - Acceleration of Digital Transformation operation / reflection
  - Comparisons, CMC review, Research Projects back on track
  - Increased collaboration between TCs & EMNs on strategic developments and research activities
- **Outlook 2020/2021**
  - Make full use of the new KCDB 2.0 platform (with *ad-hoc* training support)
  - Progress on strategic planning / roadmaps (integrating related new tools/programme, potential cooperation & synergies with EMNs, digital era paradigm shift)
  - Combine with agility face-to-face / online meetings

## Recommendations from the Working Group on the Implementation and Operation of the CIPM MRA (23 Aug 2016):

*Rec. 1a: The strategy documents of the CCs must clearly define the long-term timetable for KCs (including the repeat cycle). The RMO TCs should also plan regional KCs and SCs strategically, to reflect the needs of the RMO.”*

Strategic Planning of Comparisons  
in EURAMET Technical Committees

Document: G-TIG-PRC-001 Version: 1.0  
Approved: BoD 2018-09-25

**1. Scope**  
The 'Working Group on the Implementation and Operation of the CIPM MRA'<sup>1</sup> has formulated a set of recommendations with a view to improving the efficiency and effectiveness of the CIPM MRA. One of the recommendations concerns the management of the comparisons with the aim of managing the level of participation in comparisons more effectively.  
This document defines the requirements for the strategic planning of comparisons in the EURAMET TCs for their effective management.

**2. Abbreviations/Acronyms**  
BoD Board of Directors  
CC Consultative Committee of the CIPM  
CIPM International Committee for Weights and Measures  
CIPM MRA Mutual Recognition Arrangement  
CMC Calibration and Measurement Capability  
DI Designated Institute  
NMI National Metrology Institute  
KC Key Comparison  
RMO Regional Metrology Organisation  
SC Strategic Comparison  
TC Technical Committee

**“Strategic planning of comparisons in EURAMET TCs” (09/2018)**

The CIPM MRA. They are the pre-conditions for the implementation of the CIPM MRA. Therefore whether, how and when a comparison is carried out should be carefully considered. The overall effort for comparisons should be managed at a level keeping in mind that the CIPM MRA should continue to provide a high level of quality and integrity.  
The number of comparisons is not an objective in its own right – the planning should be strategic. Ideally comparisons will have a broad scope to cover as many services as possible and the possibility of claiming broad scope CMCs is to be encouraged when appropriate (especially in areas such as chemistry and radioactivity).  
• In order to share the workload with other RMOs, to avoid duplication of effort and to ensure transparency, the strategic comparison plans must be communicated to the experts of the other RMOs.

<sup>1</sup> This working Group was established by the resolution 5 of the 25th CGPM, on proposal by the CIPM. It met at a review workshop on 13 and 14 October 2015.

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## EURAMET KCs:

- Follow the planning of the corresponding CC KCs

## EURAMET SCs:

- **Gap Analysis:**  
which services are not covered by KCs?
- **Risk assessment:**  
could evidence other than SC be used?
- **Prioritisation:**  
How many CMCs are covered by the planned SC?

**planned well !**



**PRIORITIES**

- 1.
- 2.
- 3.



# Interlaboratory Comparisons

(only EURAMET)



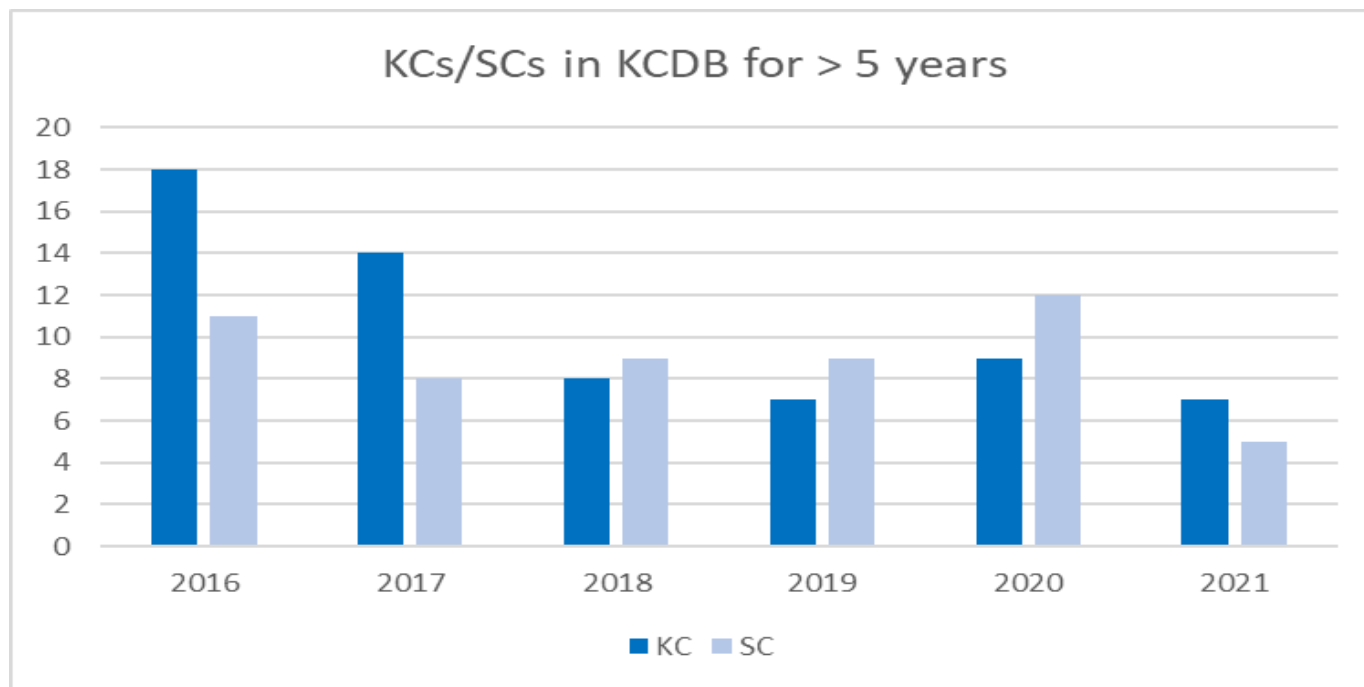
<b>TC:</b>	<b>Initiated</b> (since GA 2019)	<b>Ongoing</b>	<b>Completed</b>
AUV	1	2	2
EM	1	9	3
F	11	16	3
IR	2	4	1
L	6	8	3
M	4	17	6
MC	5	7	2
PR	2	6	3
T	1	14	4
TF	0	1	1

# “Silent comparisons”

KCs/SCs in KCDB for > 5 years without conclusion



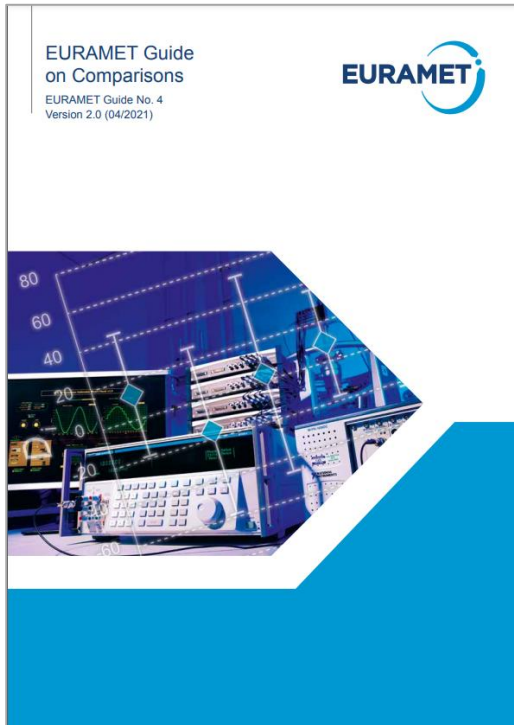
- At JCRB meetings a list of **KCs/SCs lasting for more than 5 years** is provided
- RMOs are requested to give follow-up to those “silent comparisons”
- **EURAMET Secretariat and TC-Chairs / Pilots have successfully improved comparisons’ project management**



***Work together and maintain good comparison project management !***

# Guide 4 on Comparisons

## V2

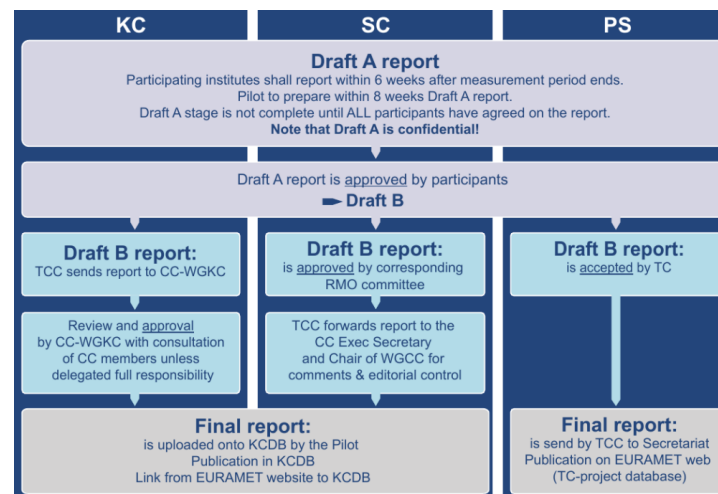


### Purpose

This document describes EURAMET specific aspects in planning, initiating and conducting inter-laboratory comparisons, with the purpose to give guidance on carrying out comparisons within EURAMET and to harmonise criteria among different Technical Committee (TC), as far as reasonable.

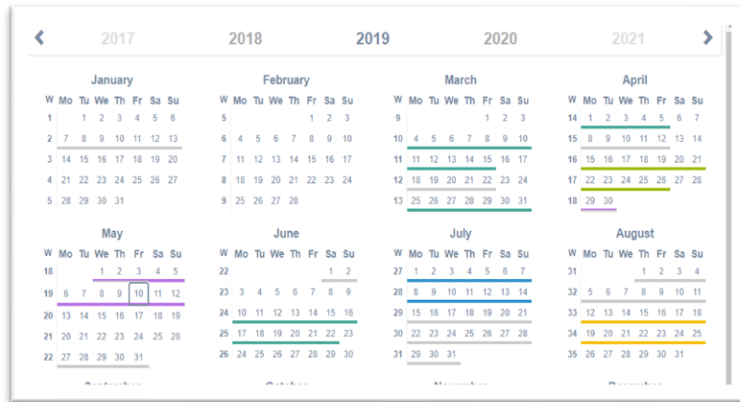
### *Reviewed (with related documentation) to integrate:*

- *Changes in CIPM MRA Guidance Documents (G1X)*
- *Improvements & evolution of practices*

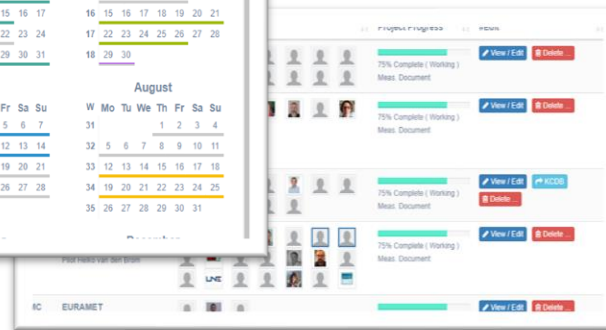


# Comparison Toolbox

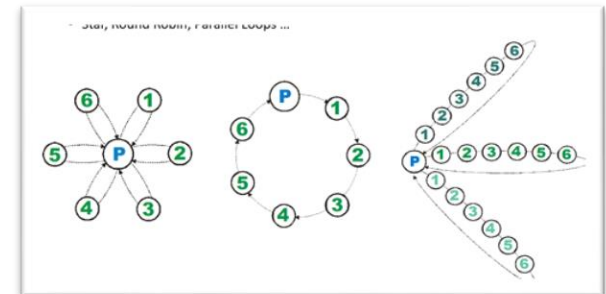
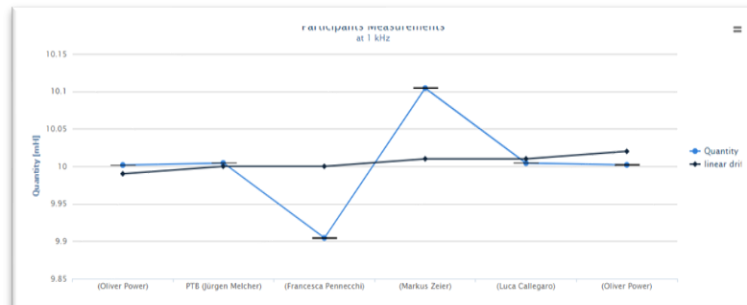
## Supporting smooth progress



*A user-friendly online  
project management tool ...*



*... designed to fit with your needs in running  
any type of comparisons ...*



*... and keep control of them.*



# Comparison Toolbox

## Supporting smooth progress



- ✓ **new functionalities** developed on the “comparison toolbox” to **better fit user needs** (similar to MS Office project but adjusted to Metrology Community running comparisons, with “**user friendly**” functionalities)

- *Group description with individual artifacts*
- *Assignment of individual tasks to participants*
- *Changes via drag and drop, possibility to duplicate tasks*
- *Option to save and present a history*
- *Extension of the mail info system, with automatic reminders*
- *Markers to track progress*
- *Ad-hoc forms to register comparison projects and report on progress*
- ...

### Create a new Comparison

1) Title of project/comparison \*

Comparison name like : EM K11 or S.35  
(The project shall have a clear title formulated in a comparison or a Pilot Study.)

2) Status

☒ Agreed/starting now  
☐ Agreed/starting later  
(If the project is going to start soon after the transmission it is going to start significantly later than the sending)

3) Subject Field \*

please choose  
(Projects can be related to one or more Technical Co-ordinations for onsite visits for review of CMS should)

4) Type of Comparison

Key Comparison (KC)  
KCDB identifier in case of KC or SC :  
description like : ac-dc voltage transfer difference  
(A description of the collaboration shall be given.)

5) Description \*

### EURAMET Project Form

#### Registration of Agreed and Starting Projects

Document: E-CO/S-FRM-009 Version: 3.0  
Approved: EURAMET 2021-04-28

1 Title of project

2 Status ☐ agreed/starting later ☒ agreed/starting now

3 Subject field Wählen Sie ein Element aus. Wählen Sie ein Element aus.

4 Type of collaboration Wählen Sie ein Element aus.

4A In the case of a comparison  
☐ Key comparison (KC)  
☐ Supplementary comparison (SC)  
☐ Pilot study (PS)  
☐ Hybrid Comparisons (HC)

KCDB identifier in case of KC/SC:

5 Description

6 Coordinator  
Institute/Country:  
Name:  
Phone:  
E-mail:

7 Participating partners

7A EURAMET members or associates (Institute's standard acronym with country code in brackets) as registered on EURAMET website.

7B Institutes not being EURAMET members or associates (Institute's full name and country in brackets)

8 Additional information (e.g. external funding available, pilot laboratory different to coordinator in case of comparisons, who acts as Third Party in the case of an HC, etc.)

9 Starting date 10 Expected completion date 11 Date

- ✓ Ad-hoc “**comparison toolbox**” **guidance document** (to be soon released)
- ✓ Developing a **framework agreement** to share it with other RMOs / LOs

# CMC Statistics

## in EURAMET TCs



TC	Reviewed (intra-RMO)	Withdrawn (deleted or greyed-out)
AUV	511	69
EM	265 revised (114 new)	57
F	13	---
IR	6 (2 new)	7 + 110 <sup>(1)</sup> + 98 <sup>(2)</sup>
L	12	1
M	---	---
MC	14 revised (138 new)	14 + 82 <sup>(1)</sup>
PR	44	---
T	117	1
TF	5 <sup>(3)</sup>	---

Notes:

- (1) 110 (IR) + 82 (MC, impacting 8 CMCs from 3 Institutes) CMCs from JRC-Geel are currently greyed out
- (2) ENEA, greyed-out on 20 May
- (3) essentially to correct editorial errors from migration to KCDB 2.0

# CMC related matters

## Validity and vitality of published CMCs



### CIPM MRA-G-12 – Quality Management Systems in the CIPM MRA

*“RMOs shall have a process in place for the on-going monitoring of the QMS of their member institutes. [...] **The planned monitoring shall ensure that the quality management systems continues to cover the declared CMCs and that the peer-reviews continue to be valid.** It shall include [...] b) **a periodic review of the QMS at the same level as the initial review, undertaken at an interval not exceeding five years.** This comprehensive review shall include examination of **evidence for the continued validity and vitality of published CMCs.** Presentations of the periodic reviews shall be delivered directly by an authorized representative from the relevant institute. In addition, the **RMO shall evaluate changes to member institutes’ QMS** that are brought to its attention at any time, if such **changes** [in key personnel, new installations or equipment, etc.) that are **likely to affect the validity of CMCs**”*

### CIPM MRA-G-13 – Calibration & Measurement Capabilities in the context of the CIPM MRA

*“a) The validity of results shall be monitored according to **ISO/IEC 17025 (ISO 17034 for CRMs as applicable).***

*b) **Peer review and recognition** according to the local RMO system **in line with CIPM MRA-G-12.**”*

*“**CMCs** that are created and submitted for intra-regional review through the KCDB web platform **shall be accompanied by appropriate technical evidence and evidence ensuring the validity of results. The institutes that create CMCs are responsible for providing the information that they believe is necessary to support their CMC claims. ...***

*A **greyed-out CMC** is a calibration and measurement capability published in the KCDB that has been **temporarily withdrawn**, with the intention of being reinstated at a later date. **The maximum period for greyed-out status is five years.** Reinstatement of CMCs inside the 5-year period is made on case-based evaluations of evidence showing that **the reasons behind the greying-out have been identified and solved.***

### Ongoing issue

- CMCs tend to grow in number with time and tech. developments ... causing growing workload for institutes & TCs to maintain & review them.
  - ➔ *Possibility to submit regularly (rather than in batches) CMCs onto KCDB 2.0 to smooth load ... yet does not reduce the growth load factor*
  - ➔ *Further discussion to share experience and progress on that key issue*
    - *How far the light shines ?*
    - *Describing CMCs as “capability” rather than “services”*
    - *Bottom-up approach addressing service categories, ...*

***CMCs shall reflect the services available to customers under normal conditions and shall not be artificially subdivided.*** The institutes are encouraged to use the percentage of coverage of their services by CMCs as a metric of success rather than the number of CMCs. **CIPM MRA G-13 – 1. Introduction**

- **Reinstatement of Greyed-out CMCs process** to involve all stakeholders (BIPM-RMOs-NMIs/DIs and related parties) in a collaborative, transparent process to allow smooth & successful progress!

# Strategic Developments with European Metrology Networks



- **Active collaboration between TCs and EMNs**
  - annual TCs and EMNs meetings
  - joint EURAMET meetings
  - dedicated workshops on Research Programmes (calls preparation)
  - joint sharepoint, ...
- **Joint developments**
  - planning and coordinating proposals within EMPIR / Partnership calls
  - integrating strategy WG & elaborating strategic roadmaps together
  - re-organizing TC (sub-)committees structure

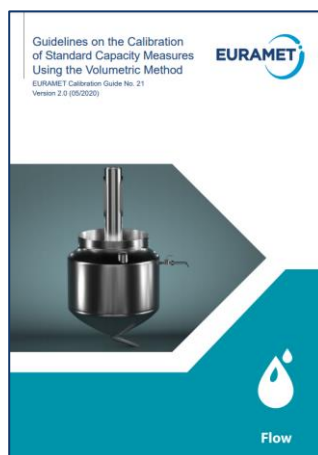
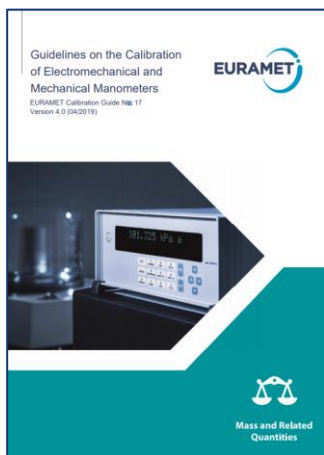
# Calibration & Technical Guides

## recent publications



### Published since GA 2019: revised or new

- No. 8 Calibration of Thermocouples – *V 3.1, 02/2020 (T)*
- No. 17 Calibration of Electromechanical and Mechanical Manometers – *V 4.0, 04/2019 (M)*
- No. 21 Calibration of Standard Capacity Measures Using the Volumetric Method – *V2.0, 05/2020 (F)*
- No. 24 Calibration of Solid Anemometers Part 1: Pitot Static Tubes – *Version 2.0, 02/2021 (F)*
- No. 25 Guidelines on the Calibration of Solid Anemometers Part 2: Thermal Anemometers – *V 1.0, 02/2021 (F)*





# Calibration & Technical Guides further activities



## Calibration and Technical Guides

- are currently reviewed and brought to new design
- LaTeX template has been developed

→ <https://www.euramet.org/publications-media-centre/>

**TC-IM Project** - *Calibration Guides for accredited laboratories in EURAMET member countries*

→ **Project Coordinator:** Wolfgang Schmid ([Wolfgang.Schmid@ptb.de](mailto:Wolfgang.Schmid@ptb.de))

- **At international level:**

- ❖ EURAMET helped BIPM test successfully API for KCDB 2.0
- ❖ Miruna Dobre centralising contact details of all **RMOs contact persons** working on **Digital Transformation** to further exchange and **synergies**. → **Action 43/1**

- **At EURAMET level:**

**TC-IM WG M4D (Metrology for Digitalisation)** working on all Digitalisation related topics within EURAMET ... and beyond

- ❖ **Strategy** → G15.10
- ❖ **Digital standards for metrological information**
- ❖ **Digital Calibration Certificates (DCCs)** **with support of all TCs!**
- ❖ ...

→ *Miruna*



# TC-IM activities in 2020-2021

## Overview



### **CIPM-MRA:**

- KCDB 2.0
- re-thinking comparisons

### **Training and guides:**

- e-learning;
- PhD program

### **Digital transformation**

- Euramet digital strategy
- 2 projects
- Coordination: WG4D



Interdisciplinary  
Metrology

- Consists of experts from EURAMET Members
- Manages existing TC-IM projects on digital transformation topics and suggests new ones where necessary;
- Organises communications channels between TC-IM and EURAMET internal and external stakeholders and other organisations active in this field;
- Organises workshops, development of guidelines and tutorials by combining expertise from the EURAMET members to ensure an efficient uptake and harmonisation of digital transformation in metrology.

## WORKING GROUP ON METROLOGY FOR DIGITAL TRANSFORMATION

The EURAMET TC-IM working group 'Metrology for Digital Transformation' (WG M4D) is bringing together the expertise of EURAMET Members specialised in data management, digital certificates and processes, Internet of Things and sensor networks.

In 2020, the European Commission (EC) published the strategy 'Shaping Europe's digital future', alongside its European industry strategy, data strategy and the White Paper on Artificial Intelligence.

The EC's digital future objectives are centered around developing a technology that works to support a fair and competitive economy, as well as an open, democratic and sustainable society. According to the EC's vision, this can only be achieved through a digital transformation of existing and established processes, in addition to securing and strengthening European digital leadership.

The working group M4D aims to support EURAMET in its mission to implement a strategic digital transformation that is aligned both with the aims of the European Commission, as well as the relevant needs of EURAMET members.



<https://www.euramet.org/technical-committees/tc-im/metrology-for-digital-transformation/>



Interdisciplinary  
Metrology

# WGM4D Workshop with EMN/JNP recommendations on R&D



- **WG M4D members to join regular EMN meetings**
- **Joint EMN workshop** on digital transformation to identify generic needs and suitable use cases – target call digital 2022.
- **Capacity building:** Small Collaborative Project (SCP) to support EMNs in considering digital transformation topics in their research agenda;
- **EMNs to formulate their needs:** expectations, needs and requirements from the WG M4D.
- **Establish a cross-sectoral focus group** to support the exchange of information on digital transformation.

# WGM4D Workshop with TC Chairs

## recommendations on DCCs



- ✓ EURAMET Seconded working as a “DCC **ambassador**”.
- ✓ DCC **education**: webinars, mentoring and other CB actions
- ✓ DCC **test cases**: develop test cases and prepare draft guides
- ✓ Industrial **stakeholder engagement**: active participation of TCs' members in TC-IM 1448 activities in establishing clear stakeholders
- ✓ Collaboration with Eurolab: to **identify needs** and ideas from European (accredited) calibration labs related to DCC.
- ✓ TC Task Forces for DCC development
- ✓ **Communication** TCs-M4D: network of TCs contacts for digital.
- ✓ Develop strategic **roadmap** on DCC: joint R&D roadmap
- ✓ Collaboration with **quality** infrastructure bodies: WELMEC, EA, CEN
- ✓ Collaboration with **other RMOs**: continuous knowledge and information exchange

### **1448 Development of digital calibration certificates (DCCs)**

The goal is to foster the development of harmonised digital calibration certificates (DCC) at national metrology institutes and calibration laboratories. The focus is on DCCs with machine interpretable information that can be used for digital workflows in measurement science, calibration, conformity assessment and industry.

**Contact:** [anke.keidel@ptb.de](mailto:anke.keidel@ptb.de)

### **1449 Research data management and the European Open Science Cloud**

The goal of this project is to foster the development of harmonised research data management (RDM) and metadata standards for metrological data and services. This is the requirement for establishing a joint metrological implementation network of the European Open Science Cloud (EOSC) principles of FAIR data and services. (Findable, Accessible, Interoperable, Reusable).

**Contact:** [giacomo.lanza@ptb.de](mailto:giacomo.lanza@ptb.de)

**Further information:** <https://www.euramet.org/technical-committees/tc-projects/>

# Concluding remarks

## 2020-2021



The pandemic revealed the great **resilience** of our Metrology Community, and stimulated a very positive **evolution** of our activities ...

... thanks to ...

- ✓ **fervent & committed scientists**
- ✓ **great communication and team spirit**
- ✓ **Global collaboration**

A **BIG THANK** to all TC Chairs & members, EMNs, RMOs / LOs and BIPM colleagues for the very pleasant and productive cooperation to **make Metrology progress in Industry, Economy and Society !**