

TC-T Chair Report to CCT 2014

May 2014



1. Structure of the EURAMET TC-T

Mirroring the CCT at RMO level, the EURAMET TC-T includes three different technical areas: 1) thermometry (T), which is the subject field, 2) Humidity (H), which is a sub-field and 3) Thermophysical Quantities of Materials (TQM), which is likely to become a sub-field in the near future.

The technical work is performed by four Working Groups (WGs):

- WG on CMC Review, which performs the review of EURAMET CMCs to be submitted to the CCT-WG8 and, when required, reviews the CMCs submitted by the other RMOs
- WG on Strategy, which generates and updates the roadmaps for the three core technical areas of the TC, supports and coordinates the participation of the TC-T in the EURAMET joint research programmes (EMRP and EMPIR)
- WG on Best Practice, which supports assessments and improved measurement procedures by updating existing and creating new guidelines and other best practice documents
- WG on Thermophysical Quantities of Materials.

The WGs meet in the same days of the annual TC-T meeting (but with no overlap with the TC-T meeting agenda), report their activities to the TC-T Plenum and ask for the TC-T Plenum vote when required.

2. Comparisons

Regional comparisons that were completed since the last CCT meeting (2012) are:

- **EURAMET.T-K3.1:** Bilateral comparison of the realisations of the ITS-90 at the fixed points of Hg, H₂O, Ga, Sn and Zn (VSL and BIM)
- **EURAMET.T-K3.3:** Bilateral comparison of the realisations of the ITS-90 over the range 83.8058 K to 933.473 K (CEM and LACOMET)
- **EUROMET.T-K5:** Comparison of local realizations of the ITS-90 between the silver point and 1700 °C using vacuum tungsten-strip lamps as transfer standards
- **EUROMET.T-K6.1:** Bilateral comparison of the realisations of local dew/frost-point temperature scales in the range -70 °C to +20 °C (MIKES and HMI)
- **EURAMET.T-K7.1:** Bilateral comparison of water triple point cells (SMU and CMI)
- **EURAMET.T-K7.2:** Bilateral comparison of water triple point cells (VSL and INTiBS)
- **EURAMET.T-K7.3:** Bilateral comparison of water triple point cells (VSL and GUM)

Regional comparisons in progress/planned and the timeline for their completion are summarized in the table below:

Comparison	Quantity	Participants	Protocol available	Measurements started	Measurements completed	Draft A available	Draft B available
EURAMET.T-K1	Realisations of the ITS-90, 2.4 K to 24.5561 K, using rhodium-iron resistance thermometers	PTB, INRIM, INTiBS, VSL, NPL	Yes	Yes	Yes	Expected SEP2014	Expected OCT2014
EURAMET.T-K3.2	Comparison of the realisations of the ITS-90 over the range 83.8058 K to 692.677 K	UME, DMDM, EIM, NIS	Yes	Yes	Yes	Expected JUL2014	Expected SEP2014
EURAMET.T-K3.4	Comparison of the realisations of the ITS-90 over the range 83.8058 K to 692.677 K	MIRS/UL-FE/LMK, DMDM, HMI, UME	Yes	Yes	Yes	Expected DEC2014	Expected FEB2015
EURAMET.T-K3.5	Comparison of the realisations of the ITS-90 over the range 83.8058 K to 933.473 K	VSL, ROTH+CO. AG	Yes	Yes	Yes	Expected MAY2014	Expected JUN2014
EURAMET.T-K4.1	Bilateral comparison of the realisations of the ITS-90 at the freezing point of Al (660.323 °C) and Ag (961.78 °C)	LNE-INM, KIM-LIPI	Yes	Yes	Expected JUN2014	Expected SEP2014	Expected OCT2014
EURAMET.T-K8	Comparison in dew-point temperature +30 °C to +95 °C	PTB	Yes	Yes	Yes	Expected DEC2014	Expected FEB2015
EURAMET.T-K8.1	Comparison in dew-point temperature +30 °C to +95 °C	PTB, E+E, INTA, MBW	Expected MAY2014	Expected SEP2014	Expected DEC2014	Expected DEC2014	Expected FEB2015
EURAMET.T-K9	Regional extension of CCT/K9	LNE-INM + 31 Labs	Expected MAY2014	Expected SEP2014	Expected DEC2015	Expected MAR2016	

EURAMET.T-S3	Comparison of the calibration of Pt/Pd thermocouples from 419.527 °C (freezing point of zinc) up to 1492 °C (Pd-C eutectic fixed point)	CEM + 18 labs	Yes	Yes	Expected OCT2015	Expected FEB2016	Expected MAY2016
EURAMET P1189	Comparison of the realisations of the relative humidity in the range from 10% to 95% at temperatures from -10 °C to 70 °C	MIRS/UL-FE/LMK + 20 labs	Yes	Yes			
EURAMET P13YZ	Comparison of the realisations of relative humidity in the range from 10% to 95% at temperatures from -40 °C to 20 °C	INTA + 11 labs	Expected MAY2014	Expected OCT2014	Expected FEB2016	Expected JUN2016	

4. CMCs

The review of EURAMET CMCs is performed cyclically (yearly) by a team of EURAMET TC-T experts (typically two experts for each group of services), coordinated by the chairman of the EURAMET WG on CMC review.

The batches of EURAMET TC-T CMCs published in the KCDB since the last CCT meeting (2012) are:

- **EURAMET.T.10.2012** on humidity (5 CMCs), thermocouples (75 CMCs), industrial resistance thermometers (19) fixed points and SPRTs at fixed points (2 CMCs)
- **EURAMET.T.11.2012** on fixed points and SPRTs at fixed points (2 CMCs)
- **EURAMET.T.12.2013** on fixed points and SPRTs at fixed points (160 CMCs)
- **EURAMET.T.13.2013** on ultra-low and very low temperature devices and thermometers (5 CMCs).
- **EURAMET.T.14.2013** on radiation thermometry (24 CMCs)
- **EURAMET.T.15.2014** on SPRTs at fixed points (8 CMCs)

A total of 300 CMCs were published in the KCDB in the past two years.

Two new EURAMET batches (one of relative humidity CMCs and one of radiation thermometry CMCs) are currently under inter-RMO review.

5. EURAMET Joint Programmes

Since 2007, the EURAMET activities are dominated by two consecutive metrology research programme jointly funded by the EU and a large majority of EURAMET countries. The first programme, the European Metrology Research Programme (EMRP), was launched in 2007 with 7 calls from 2007 to 2013, it involved 23 EURAMET countries with a total budget of 400 M€ and will end in 2017. The second programme, the European Metrology Programme for Innovation and Research (EMPIR), with calls from 2014 to 2020, involves 28 EURAMET countries, for a total of 600 M€ and will end in 2024.

The engagement of the EURAMET TC-T community in such programmes is coordinated by the TC-T Strategy WG: a web-based share-point has been used to collect ideas for potential research topics and, on the basis of the submitted ideas, the Strategy WG proposes how to approach bidding into the call.

The EMRP joint research projects (JRPs) fully run by the TC-T are:

- “Novel Techniques for Traceable Temperature Dissemination, (NOTED), coordinated by Dolores del Campo”
- “Implementing the New Kelvin, InK”, coordinated by Graham Machin
- “High Temperature Metrology for Industrial Applications, HiTeMs”, coordinated by Graham Machin
- “Metrology for Meteorology, MeteoMet”, coordinated by Andrea Merlone
- “Metrology for Moisture in Materials, METefnet”, coordinated by Martti Heinonen

The EMRP and the EMPIR programmes are inducing radical changes in the EURAMET metrology landscape: because of the relevant EU funding received through the EMRP/EMPIR, the national metrology programmes are becoming strongly EMRP/EMPIR-driven, with, beyond base maintenance of facilities, only residual funding and resources available for non-EMRP/EMPIR traditional activities (like Key Comparisons).

6. EURAMET TC-T Roadmaps

As part of a larger process undertaken by the EURAMET metrology TCs to guide the direction of metrology research of the EURAMET NMIs over the next decade, the EURAMET TC-T has generated and maintains technical roadmaps for 1) thermometry, 2) humidity and moisture and 3) thermophysical quantities. The roadmaps first identify the societal grand challenges and other high-level drivers that need to be addressed

(the triggers), then formulate concrete targets where the thermometry community could contribute to address the triggers and finally identify the metrology and background science required to meet the targets. The three EURAMET TC-T roadmaps were presented in the recent TEMPMEKO2013 conference and the corresponding three papers will be published in the International Journal of Thermophysics.

Andrea Peruzzi
TC-T chairperson
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