

### 1. General Aspects

The TC-T, besides the original Thermometry Subject Field, includes since 2002 the Humidity Sub-Field. Since 2009 the annual TC-T meeting is structured in two days as follows:

- Half a day dedicated to the Humidity Sub-Field
- Half a day dedicated to common Thermometry and Humidity issues (BIPM news, EURAMET news, EMRP calls, roadmaps)
- Half a day dedicated to the Thermometry Field
- Half a day dedicated to the visit of host laboratories and/or voluntary presentations from the contact persons

The four WGs (WG on CMC Review, WG on Strategy, WG on Best Practice and WG on Thermophysical Properties of Materials) meet separately in the days of the TC-T meeting (but with no superimposition to the TC-T meeting agenda), report their activities to the TC-T Plenum and ask for the TC-T Plenum vote when required.

A workshop with more technical content is often organized on the day before or after the TC-T meeting. The TC-T is currently contemplating whether to propose to the BoD the creation of a new SC on Thermo-physical Quantities of Materials (TQM).

### 2. Projects

The status of all TC-T projects can be viewed on the TC-T project database. Apart from the new projects started after the last annual TC-T meeting, the database reflects the status of the projects at the time of the last annual TC-T meeting (April 2012), when progress reports were submitted by the project coordinators. An up-to-date overview of the status of all the projects will be made available during the coming annual TC-T meeting (April 2013), after receiving the annual progress report from the project coordinators.

Shortly, 43 projects are currently active, 29 in the field of thermometry, 10 in humidity and 4 in thermophysical properties of materials. Most of the projects are comparisons (23) but there is also a good number of research projects (10) and some traceability (4) and consultation (4) projects. In the past year, 8 new projects were initiated.

### 3. Comparisons

EURAMET.T-K5 (Radiation Thermometry, Realization of the ITS-90 up to 1700 °C) is now close to completion: the final report was submitted for approval to the CCT-WG7 already many months ago.

A number of EURAMET bilateral comparisons, typically between one emerging/small NMI, needing the link to a main KC, and one major NMI, providing the required link, was brought to completion in the past year (EURAMET.T-K3.1, EURAMET.T-K3.3, EURAMET.T-K7.2, EURAMET.T-K7.3).

The first EURAMET comparison on relative humidity (project n. 1189) was initiated in 2012.

EURAMET.T-K8 comparison (Dewpoint temperature in the range 30 °C to 95 °C, project nr. 717) is close to completion: the measurements were completed and the Draft A report is being prepared.

The major KC in Thermometry, CCT-K9, Comparison of SPRTs calibration at fixed points from Ar to Zn is progressing. The measurements at the pilot laboratory (NIST) are nearly completed and follow-up measurements have been initiated at many participants' laboratories. Five EURAMET laboratories are participating in this KC.

The regional extension of CCT-K9 (EURAMET.T-K9) is already under consideration of the 5 EURAMET NMIs that are taking part in CCT-K9.

The recent review of EURAMET radiation thermometry CMCs has clearly evidenced the need of new KCs in the field of radiation thermometry. This issue will be discussed at global level in the next CCT meeting (May 2014).

### 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 WG on CMC review.

Though harmonized and scientifically-based review protocols implemented by the CCT WG8 are used, the CMC review remains a time-consuming process, particularly at the inter-RMO review stage.

The batches of EURAMET TC-T CMCs published in the KCDB in the past year are:

- EURAMET.T.10.2012 on industrial thermometers (19 CMCs), thermocouples (75 CMCs) and humidity (16 CMCs)

- EURAMET.T.11.2012 on triple point of water (2 CMCs)
- EURAMET.T.12.2013 on fixed points, SPRTs at fixed points and SPRTs in ITS-90 sub-ranges (157 CMCs)

A total of 269 CMCs were published in the KCDB in the past year.

Two new batches (one of humidity CMCs and one of radiation thermometry CMCs) will be submitted to CCT-WG8 in the coming weeks.

## 5. Activities of the Sub-Committees

In 2012, a workshop on “Moisture in Materials” was organized at DTI (Copenhagen). The workshop proved to be a very useful preparative step towards the preparation of a EMRP PRT on “Moisture in Materials”.

In the past year, the Sub-Committee maintained its prominent role in conducting KCs:

- CCT-K8 (dewpoint range +30 °C to +90 °C) was initiated. The pilot of this CCT KC is one EURAMET DI, INTA (NIST co-pilot). The regional extension of CCT-K8, EURAMET.T-K8, piloted by PTB, is close to completion: the measurements were completed and the Draft A report is being prepared.
- CCT-K6 (dew/frostpoint range -50 °C to +20 °C), piloted by NPL, is close to completion. Draft A report is now available.

## 6. Participation in EMRP

The participation of the TC-T in the EMRP calls 2012 was limited (only 3 PRTs submitted). Many NMIs lamented a “saturation effect”: having been quite successful in the past years calls, they are now involved in making progress in the already funded JRPs and they do not have resources for getting involved in new PRTs.

Nevertheless, both the humidity and thermophysical community were successful in SIB Call 2012 with a PRT on “Moisture in Materials” and a PRT on “Metrology for thermal protection materials”, respectively.

The temperature community is involved in many running JRPs, particularly the NOTED (Novel Techniques for Traceable Temperature Dissemination), InK (Implementing the New Kelvin) and HiTeMs (High Temperature Metrology for Industrial Applications) projects.

## 7. Meetings

The annual TC-T meeting 2012 was held in Istanbul on April 18<sup>th</sup> and 19<sup>th</sup>. In the afternoon of the 19<sup>th</sup>, after the end of the meeting, on the initiative of the TC-T chairperson and with the goal of giving to small and emerging NMIs/DIs the possibility to express their needs, presentations were given on voluntary basis by many CPs. All the presentations given can be seen in the TC-T restricted area of the EURAMET website. As the event received very positive feedback, it will be repeated in the annual meeting 2013.

On April 20<sup>th</sup> 2012, a TC-T workshop on the involvement of the TC-T in the EMRP programme was held in UME premises (Kocaeli). The workshop included not only technical presentations on the JRPs in which the TC-T is more heavily involved, but also discussions on our plans for the future calls and on what we learnt from sharing the experience of the coordinators.

## 8. Issues

In the past year, the creation of a new Sub-Field on Thermophysical Quantities of Materials (TQM) within the TC-T has been considered.

Pros and cons in having a new SC on TQM were identified as follows:

Pros:

- Mirror the structure at CCT level, where WG9 is the counterpart (EURAMET TC-T SC TQM role in CCT and RMO KC/SCs, CMC review...)
- SI-traceable TQM is crucial with respect to energy efficiency/conservation
- TQM community more focused than TC-T on “real world” (solving measurement problems for industry) as proved by TQM success in EMRP
- Synergy TQM/TC-T could benefit both: TC-T more focused on “real world” and TQM more attentive to SI traceability

Cons:

- Not many NMIs have strong activity on TQM. Most TQM research is scattered among many DIs, universities and research institutes (traceability issues).
- Identify right person to act as a link to the SC in each country
- Large variety of thermal quantities, need to identify and focus on those having large societal impact
- TC-T meeting: run SC TQM in parallel to SC Humidity to avoid extending the length of the TC-T meeting.

During the coming TC-T meeting (April 2013) a final decision on whether to ask the BoD to create a new SC on TQM will be taken. The knowledge of the criteria that the BoD will apply in taking such decision could be helpful for the TC-T.

## **9. Strategic planning**

The WG on Strategy is in charge of the strategic planning of the TC-T. The following actions were taken in the past year:

- EMRP 2012/2013 PRTs ideas were collected in an appropriate web-based Sharepoint
- The three roadmaps on Thermometry, Humidity and Thermophysical Properties were revised in order to make them more in line with the emerging requirement of the future EMPIR programme. It was decided to publish the three roadmaps in three separate peer reviewed paper at the TEMP-MEKO2013 Symposium
- A TC-T EMRP workshop was held at TUBITAK UME on April 20<sup>th</sup> 2012. The workshop included not only technical presentations on the JRPs in which the TC-T is more heavily involved, but also discussions on our plans for the future calls and on what we learnt from sharing the experience of the coordinators.
- It was recognized that the EMRP JRPs are the best source of information on TC-T stakeholders and, in order to collect such information, it was decided to circulate a survey on stakeholders engagement in the several JRPs where the thermal community is currently involved.

## **10. Outlook for 2012/2013**

The major objectives for the coming year are:

- EMRP 2013 Environment and Energy Calls: collect ideas for PRTs, identify PRTs and coordinate their submission
- Assess the maturity of the Thermophysical Properties community and, if appropriate, propose to the BoD the creation of a new SC on “Thermophysical Quantities of Materials (TQM)”.
- Continued effort in CMC review process
- TC-T annual meeting Prague, 11-12 April 2013
- TC-T Workshop on “Calorimetric Techniques & Innovations in the field of Thermophysical Properties of Materials, Current and Future Developments”, (Prague, 10 April 2013)

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