

**CCT Task Group on Thermophysical Quantities**  
**Activity Report, May 2014 – May 2017**

Report prepared by: Jean-Remy Filtz, LNE

Date of Report: 23 May 2017

This report summarized the activities undertaken by CCT-TG-ThQ over the period between CCT Convocations CCT-2014-27<sup>th</sup> Meeting and CCT-2017-28<sup>th</sup> Meeting.

**Terms of Reference of TG-ThQ are to:**

- ➔ Identify, study and advise the CCT on matters related to thermophysical quantities;
- ➔ Foster and strengthen the scientific and technical collaborations among current and prospective CCT TG-ThQ members;
- ➔ Disseminate the metrological expertise and knowledge for the benefit of Industry and Society;
- ➔ Develop and maintain active connections with the international thermophysical quantities community.

**TG-ThQ is tasked with:**

- ➔ Reviewing the service categories and identify research topic priorities in the field;
- ➔ Suggesting new comparisons to be performed in the field;
- ➔ Coordinating and performing ongoing and future comparisons useful for the preparation of CMC entries related to the field;
- ➔ When required, and according to priorities defined by the TG-ThQ, drafting documents on uncertainty budgets and guidance related to thermophysical quantities measurements;
- ➔ Exchanging information on innovative techniques relevant to the field of thermal quantities measurements;
- ➔ Providing elements useful for the CCT strategic planning;
- ➔ Contributing to provide information to one of the electronic tools managed by the CCT and useful for the thermal metrology community including the thermophysical quantities community.

**Members:** as agreed at CCT, May 2014

Naofumi Yamada (AIST/NMIJ, Japan), Leonel Lira-Cortés (CENAM, Mexico), Ferruccio Girard (INRIM, Italy), Kwon (KRISS, South Korea), Jean-Remy Filtz, Chair (LNE, France), Bruno Hay (LNE, France), Leonard Hanssen (NIST, USA), Jintao Zhang (NIM, China), Jiyu Wu (NPL, UK), Jörg Hollandt (PTB, Germany), Nikolay Sokolov (VNIIM, Russia),

**Co-opted Members:**

Megumi Akoshima (AIST/NMIJ), JooHyun Lee (KRISS), Lindsay Chapman (NPL), Christian Monte (PTB).

**Membership changes:**

In 2014: Tetsuya Baba (AIST/NMIJ) resigned from his position. Naofumi Yamada was nominated as the new delegate for Japan. Jean-Remy Filtz was elected as New Chairman. In 2016: VNIIM nominated Serguey Kondratiev as new CCT-TG-ThQ delegate for Russia in order to replace Nikolay Sokolov. Lindsay Chapman left NPL.

**List of Meetings held in period May 2014 – May 2017**

Date	Place	Venue	Minutes	Comment
May 2014	Sèvres, France	BIPM	Website CCT	
September 2014	Porto, Portugal	ECTP 2014	NA	Short Meeting
June 2015	Boulder, Colorado, USA	Boulder Symposium	Website CCT-TG-ThQ, restricted area	
July 2016	Zakopane, Poland	Tempmeko' 16	Website CCT-TG-ThQ, restricted area	
May 2017	Sèvres, France	BIPM	Website CCT+ Website CCT-TG-ThQ, restricted area	Available after the Meeting

**Actions Summary vs Tasks**

Action	Topic	Status
Coordinating and performing ongoing comparisons	CCT-S1; Infrared spectral normal emissivity	Final report approved by the WG-KC. All documents are available on the BIPM-KCDB. Comparison has been published in Metrologia, 2016, 53, Tech. Suppl.
	CCT-S2; Thermal Conductivity	Draft B in progress. Will be available for approval by CCT-WG-KC, Q2/Q3-2017.
	CCT-S3; Thermal Diffusivity	Following technical discussions between AIST/NMIJ and LNE Draft A still under review within the group. Draft B still to be provided. Issue by Q3/Q4-2017 to be confirmed.
Preparing CMC entries	Thermal Diffusivity	CMC protocol drafted by NMIJ and submitted for approval to CCT-WG-CMC in 2016. Review in progress. Issue by Q3/2017
	Thermal Conductivity	CMC protocol drafted by VNIIM and submitted for technical discussion and approval to the TG-ThQ by Q2-2017
	Infrared spectral normal emissivity	CMC protocol to be drafted by NIST. Should be submitted for approval to the group in 2017. Issue by Q2/Q3-2017 to be confirmed.

Action	Topic	Status
Fostering and strengthening the scientific and technical collaborations	Metrology Research Programme	<p>At least two actions have been led:</p> <ol style="list-style-type: none"> <li>1) Within APMP, new proposals for international comparisons have been discussed, approved and registered by BIPM.</li> <li>2) Within Euramet/EMRP/EMPIR, new Joint Research Projects (JRPs) have been launched and performed. Some of them are still in progress. CCT-TG-ThQ Members are strongly involved.</li> </ol>
Developing and maintaining active connections with the international thermo-physical quantities community	Tempmeko' 16	<p>Euramet TC-T-WG-TQ Members have been invited to participate in the satellite meeting devoted to the CCT-TG-ThQ members.</p> <p>The main objectives where to present work in progress and to review new developments in the field of ThQ currently in progress within the CCT and Euramet groups.</p>
Disseminating the metrological expertise and knowledge	<p>ECTP-2014, Porto, Portugal, Euramet-TC-T-2015, Lisbon, Portugal, Temperatura-2015, St Petersburg, Russia, Boulder Symposium-2015, Colorado, USA CIM-2015, Paris, France Euramet-TC-T-2016, Valetta, Malta Tempmeko-2016, Zakopane, Poland Euramet-TC-T-2017, Madrid, Spain</p>	<p>Non exhaustive list of Conferences and Meetings where Th-Q Scientific Works have been promoted and valorised.</p>

Action	Topic	Status
<p>Suggesting new comparisons to be performed in the field</p>	<p><u>Dilatometry:</u> Thermal Expansion Coefficient (TEC)</p> <p><u>Calorimetry:</u> Heat of Combustion</p>	<p>Technical discussions have been launched in 2016 and should be followed during the CCT-TG-ThQ Meeting in BIPM, Sèvres, 2017.</p> <p>At least 2 topics have been identified related to Dilatometry and Calorimetry. Preliminary capabilities of the different ThQ Members have been collected (see Zakopane Meeting Minutes, BIPM Website, restricted area).</p> <p>Additionally, Specific Heat of materials and Calorific Value of Gases have been mentioned as alternative or of additional interest.</p>

**Annex 1: Agenda of CCT Task Group Thermophysical Quantities Meeting**

**Date, Time**

June 23rd, 2015 (Tuesday)

3:00 - 6:00 pm

**Venue**

University of Colorado, Boulder, Colorado  
Room ECCR 139 (in the Engineering Centre)  
<http://www.colorado.edu/campusmap/>

**Participants**

Members of the Task Group  
Invited participants

**Agenda**

15:00 – 18:00

1. Opening
2. Apologies
3. Actions from the previous meeting (J.-R. Filtz)
4. Towards CMCs : Report of the different comparisons
  - a. Actions in progress, deadlines to be respected, status updated:
    - i. Emissivity (L. Hanssen)
    - ii. Thermal Conductivity (B. Hay)
    - iii. Thermal Diffusivity (M. Akoshima)
5. Strategy
  - a. Next Comparisons
6. Technical and Scientific Presentations (Proposals)
  - a. News from SIM (L. Hanssen / L. Lira-Cortès – 5 min each)
  - b. News from APMP (M. Akoshima / J. Zhang / X from KRISS – 5 min each)
  - c. News from EURAMET (J.-R. Filtz – 10 min)
  - d. News from Other Metrology Regions or Institutes (5 min each)
  - e. EMRP ThinErgy project - Thermal characterization of thin-film materials. (B. Hay-10 min)
  - f. Questions
7. Any Other Business – Announcements (CIM 2015, TEMPMEKO 2016,...)
8. Next Meeting

## **Annex 2: Agenda of CCT Task Group Thermophysical Quantities, Zakopane, Poland, 1 July 2016**

### Introduction of the participants

1. Approval of the agenda
2. Appointment of Rapporteur
3. Approval of the Boulder Meeting Minutes
4. S2 : Thermal Conductivity - Supplementary Comparison - Progress
5. S3 : Thermal Diffusivity - Supplementary Comparison – Progress
6. Future Comparisons and Activities
  - a. Thermal Expansion – T. Kompan
  - b. Other proposals - All
7. News from APMP / ThQ – M. Akoshima /N. Yamada / S. Kwon / J. Zhang
8. News from COOMET / ThQ – A. Pokhodun / T. Kompan
9. News from EURAMET / ThQ – J.-R. Filtz with support of F. Girard /J. Hollandt /J. Wu
10. News from SIM / ThQ – L. Hanssen / L. Lira Cortes
11. Any Other Business

### **Members**

Jean-Remy Filtz (Chair, CCT TG ThQ)  
Naofumi Yamada (AIST-NMIJ, Japan)  
Leonel Lira-Cortes (CENAM, Mexico)  
Ferruccio Girard (INRIM, Italy)  
Suyong Kwon (KRISS, South Korea)  
Bruno Hay (LNE, France)  
Jintao Zhang (NIM, China)  
Leonard Hanssen (NIST, USA)  
Jörg Hollandt (PTB, Germany)  
Jiyu Wu (NPL, UK)  
Anatoly Pokhodun (VNIIM, Russia)

### **Invited CCT Members:**

Yuning Duan (CCT President)  
Susanne Picard (Executive Secretary)

### **Invited participants:**

Megumi Akoshima (AIST-NMIJ, Japan)  
Joo Hyun Lee (KRISS, South Korea)  
Tatiana Kompan (VNIIM, Russia)

### *Euramet TC-T WG TQ Representatives/Observers not previously listed in CCT-TG-ThQ :*

Dolores Del Campo (CEM, Spain)	Graham Machin (NPL, UK, TC-T Chairman)
Ales Blahut (CMI, Czech Republic)	Christian Monte (PTB, Germany)
Radek Strnad (CMI, Czech Republic)	Peter Pavlásek (SMU, Slovakia, Deputy Chair)
Lenka Knazovicka (CMI, Czech Republic)	Murat Kalemci (UME, Turkey)
Emese Thurzo-Andras (MKEH, Hungary)	Humbet Nasibli (UME, Turkey)
Simona Lago (INRIM, Italy)	Miguel Villamañán (UVa, Spain)
Vito Fericola (INRIM, Italy)	Nenad Milosevic (VINCA, Serbia)

**Annex 3 : Agenda of CCT TG-ThQ, Tuesday 30 May, BIPM, Sèvres, France**

Meeting of the CCT Task Group on Thermophysical Quantities

Date: Tuesday 30 May, 2017

Time: 9:00 – 13:00

Venue: BIPM, Sèvres, France

**Agenda:**

1. Welcome, Introduction of the participants
2. Approval of the agenda
3. Appointment of Rapporteur
4. Approval of the Zakopane Meeting Minutes
5. S2 : Thermal Conductivity - Supplementary Comparison – Progress / CMC protocol status
6. S3 : Thermal Diffusivity - Supplementary Comparison – Progress / CMC protocol status
7. Service Categories, Future Comparisons and Activities
  - a. Thermal Expansion – S. Kondratiev
  - b. Calorimetric Quantities – All
  - c. Other - All
8. News from APMP / ThQ – M. Akoshima / N. Yamada / S. Kwon / J. Zhang
9. News from COOMET / ThQ – A. Pokhodun / S. Kondratiev
10. News from EURAMET / ThQ – J.-R. Filtz with support of F. Girard / B. Hay / J. Hollandt / J. Wu
  - a. Highlights on a European Project : Metrology for Thermal Protection Materials - J. Wu
11. News from SIM / ThQ – H. Yoon on behalf L. Hanssen / L. Lira Cortes
12. Any Other Business
13. Close of the meeting

**Members**

Jean-Remy Filtz (Chair, CCT TG ThQ)

Ferruccio Girard (INRIM, Italy)

Leonard Hanssen (NIST, USA)

Bruno Hay (LNE, France)

Jörg Hollandt (PTB, Germany)

Sergey Kondratiev (VNIIM, Russia)

Su Yong Kwon (KRISS, South Korea)

Leonel Lira-Cortes (CENAM, Mexico)

Jiyu Wu (NPL, UK)

Naofumi Yamada (AIST-NMIJ, Japan)

Jintao Zhang (NIM, China)

**Invited CCT Members:**

Yuning Duan (CCT President)

Susanne Picard (CCT Executive Secretary)

**Invited participants:**

Megumi Akoshima (AIST-NMIJ, Japan)

Edgar Mendez-Lango (CENAM, Mexico)

Humbet Nasibli (UME, Turkey)

Kirill Pilipenko, (VNIIFTRI, Russia)

Anatolii Pokhodun (VNIIM, Russia)

Nonhlanhla Precious Cele (NMISA, South Africa)

Eric Van der Ham (NMIA, Australia)

Howard Yoon (NIST, USA)