31th SESSION
BIPM-CCT
TG-ThQ REPORT

JEAN-REMY FILTZ

2024-05-16-17

OFFICIAL PARTICIPANTS : 15 MEMBERS

Jean-Remy	Filtz	LNE	France	Chairman
Wei	Dong	NIM	China	Member
Lenka	Kňazovická	CMI	Czech Republic	Representing S. Kaponec - Member
Bruno	Hay	LNE	France	Member
Albert	Adibekyan	PTB	Germany	Representing C. Monte - Member
Ferruccio	Girard	INRIM	Italy	Member
Naofumi	Yamada	NMIJ	Japan	Member
Megumi	Akoshima	NMIJ	Japan	Member
Daniel	Cárdenas	CENAM	Mexico	Member
Sergei	Kondratev	VNIIM	Russia	Member
Peter	Pavlasek	SMU	Slovakia	Member
Suyong	Kwon	KRISS	South Korea	Member
Humbet	Nasibli	TÜBITAK-UME	Turkey	Member
Jiyu	Wu	NPL	UK	Member
Howard	Yoon	NIST	USA	Member

OUTLINES

Status of the different Supplementary Comparisons

S	Topic	Pilot	Status	Reviewing process	Publication
S1	Emissivity	NIST (L. Hanssen)	finished	Closed	Metrologia, Volume 53, Nr 1A
S2	Thermal Conductivity	LNE (B. Hay)	finished	Closed	Metrologia, Volume 57, Nr 1A
S3	Thermal Diffusivity	NMIJ (M. Akoshima)	finished	Draft B reviewed. update to be made and submitted to ad-hoc WG < end 2024	To be published

OUTLINES

Status of the different CMC Protocols

CMC Protocol	Topic	Pilot	drafting	Reviewing process	Publication
S1	Emissivity	NIST (L. Hanssen)	finished	finished	Should be published. To be checked with CCT secretary
S2	Thermal Conductivity	LNE (B. Hay)	To be checked	To be done	To be published
S3	Thermal Diffusivity	NMIJ (M. Akoshima)	finished	finished	Published

OUTLINES

Status of the new proposed comparisons

- Gas Calorimetry (Pilot VNIIM-Russia) - (stopped/abandoned)

- Thermal Expansion Coefficient (Pilot VNIIM-Russia)
  - Absolute measurements (delayed)
  - Relative measurements (standby)

Thermal Expansion Coefficient

KEY/SUPPLEMENTARY COMPARISON IN THE FIELD OF CTE MEASUREMENTS

Comparison of national standards of CTE - dilatometers
(absolute and comparative methods)
using samples of various CTE value

Material and CTE value:
monocrystalline aluminum and silicon
(polycrystalline glass)
$2.0 \cdot 10^{-6} \div 8.0 \cdot 10^{-6}\ K^{-1}$

Absolute method	Comparative method
RUSSIA (VNIIM) – pilot	RUSSIA (VNIIM) - pilot
JAPAN (NMIJ)	FRANCE (LNE)
CHINA (NIM)	TURKEY (UME)
GERMANY (PTB)	UK (NPL)
Delayed	Standby

PROGRESS

CURRENT STATE:
Shape of the samples is determined

Temperature range is being negotiated

Preparation of draft technical protocol

SAMPLES:
Preparation and evaluation of homogeneity and stability

INTER-LABORATORY COMPARISON ON ENTHALPY OF FUSION MEASUREMENT

- **Proposal of inter-laboratory comparison**
  - Measurements of enthalpy of fusion of pure materials (e.g. indium, tin, silver…)
  - Temperature range from RT to 800 °C
  - Absolute measurement methods
    - Measurements directly traceable to SI
    - No use of reference materials for the calibration of the calorimeters
- **LNE is willing to pilot this comparison if there are other NMIs interested to participate**
  - Preparation of the inter-laboratory comparison protocol
  - Sourcing of the selected materials and preparation of the batches of specimens
  - Checking of the homogeneity of the batches

OUTLINES

Technical and Scientific News

- APMP (M. Akoshima)
- COOMET (S. Kondratiev)
- EURAMET (B. Hay)
- SIM (H. Yoon)

APMP - PROJECTS

Supplemental Comparisons

- ✓ APMP T-S9 Thermal diffusivity (Pilot: NMIJ)
  - 4 laboratories are finished measurements and reported results. (2 laboratory not yet.)
  - Draft A is under construction.

- ✓ APMP T-S10 Thermal conductivity (Pilot: KRISS)
  - laboratories are almost finished measurements and reported results. (2 laboratory not yet.)
  - Draft A is under construction.

COOMET PROJECT № 744/RU-a/18 (COOMET.T-S4) COMPLETED

Comparison of combustion energy of coal samples with different sulfur content:

Supplementary Comparison in Thermometry, Thermophysical quantities

Coal samples with different sulfur content:
AH – 1,192 %,
AL – 0,193 %,
LC – 0,412 %

VNIIM, Russia - pilot
BelGIM, Belarus
NIM, China
BRML-NIM, Romania
TÜBİTAK UME, Turkey
PTB, Germany

ВНИИМ

БелГИМ

中国计量科学研究院
National Institute of Metrology,China

BRML 1864

PTB

TÜBİTAK UME

PROGRESS

Technical Protocol – February 2021
Draft A Report – April 2021
Draft B Report – October 2021
Final Report – May 2023

CURRENT STATE:
The project was completed in 2023

COOMET PROJECT № 780/RU-a/19 COMPLETED

Comparison of national reference gas calorimeters using samples of gas mixtures

Pilot Comparison in Thermometry, Thermophysical quantities

Gas mixtures:
1) H_2: 10,101 %, CH_4: balance
2) CO_2: 40,22% , CH_4: balance

VNIIM, Russia - pilot
TÜBİTAK UME, Turkey
LNE, France

ВНИИМ

TÜBİTAK UME

LNE
Le progrès, une passion à partager

PROGRESS

Technical Protocol – November 2021
Draft A Report – April 2022
Draft B Report – February 2023
Final Report – April 2023

CURRENT STATE:
The project was completed in 2023

Report on the activities of WG TQ

EURAMET

Bureau International des Poids et Mesures

EURAMET project 1524

Ongoing

- **Title :** Comparison on thermal diffusivity measurements of high conductive materials by laser flash method

Objective : Supplementary comparison Temperature range : from 23 °C to 1400 °C

3 "unknown" materials selected by the pilot : 1 isotropic graphite + 2 metallic alloys

5 participating partners : *LNE-Cnam (FR), NPL (UK), PTB (D), VINS (RS), NMIJ (JP)*

- B. Hay sent information about this comparison to K. Anhalt / PTB (May 2023) **Action 2023-4**
- Comparison protocol sent to EURAMET TC-T WG CMC for review (June 2023) **Action 2023-5**
  - ⇨ Protocol validated by TC-T (July 2023)
  - ⇨ Supplementary comparison registered in KCDB as **EURAMET.T-S8** (Sept 2023)
- LNE-Cnam prepared the specimens and tested the homogeneity of the batches (cf. next slide)
- Specimens sent to participants in March (metallic alloys) and April (graphite)

Thank you for your attention!