



MINUTES

of the 17th meeting of the COOMET Technical Committee TC 1.10 “Thermometry and Thermophysics” online 28 October 2020

1. Opening of the meeting, welcoming, introduction of the participants of the meeting, approving of the agenda of day 1.

The meeting was opened by Chairperson of COOMET Technical Committee “Thermometry and Thermophysics” (TC 1.10) Anatoly Pokhodun, who addressed the meeting participants with a welcoming speech and wished them successful work.

A. Pokhodun welcomed the TC members and guests, who were present at the meeting. The meeting was attended by the representatives of 13 countries:

AZERBAIJAN

Mr. Hasanov R., AzMI

BELARUS

Mr. Krivonos P., BelGIM

BOSNIA AND HERZEGOVINA

Mr. Cohodarevic S., IMBIH

GEORGIA

Mr. Chelidze Yu., GEOSTM

SPAIN

M^a Dolores del Campo Maldonado, Centro Espanol de Metrologia

KAZAKHSTAN

Mrs. Duysebayeva K., SKS RSE "KazInMetr"

KYRGYZSTAN

Mrs. Denisova M., CSM

LITHUANIA

Dr. Gaidamoviciute L., FTMC

MOLDOVA

Mr. Bordianu K., INM

RUSSIA

Mr. Pokhodun A., VNIIM

Mr. Fuksov V., VNIIM

Mrs. Korchagina Ye., VNIIM

Mrs. Vlasova V., VNIIM
Mr. Razhba Ya., VNIIFTRI
Mr. Vinge M., VNIIFTRI

SLOVAKIA

Mr. Duris S., SMU
Ms. Durisova S., Slovak Institute of Metrology

TURKEY

Dr. Nasibli H., TUBITAK UMEYME

UKRAINE

Mrs. Fil S., NSC "Institute of Metrology"

COOMET SECRETARIAT

Ms. Liakhova, BelGIM, Belarus

The participants of the meeting approved the following agenda:

1.	On the activities of COOMET TC 1.10 in 2019 – 2020
2.	On the activities of EURAMET Technical Committee TC-T
3.	On holding a joint meeting of COOMET TC.10 and EURAMET TC-T in 2021
4.	Activities of Consultative Committee for Thermometry in the field of organization of comparisons of the national measurement standards of the units of thermophysical quantities
5.	Discussion of the progress of work on COOMET projects in the field of “Thermometry and Thermophysics”
	1) The course of work on Project 704/RU-a/16 “Regional key comparisons of national temperature unit measurement standards at the triple point of mercury”
	2) The course of work on Project 544/RU-a/11 “Regional comparisons of gas humidity measurement standards. Temperature of dew/frost point is from minus 50 °C to 20 °C”
	3) The course of work on Project 768/GE/18 “Comparisons of the measurements of relative humidity instruments in the range of relative humidity (30-90)% at 23 °C
	4) The course of work on Project 744/RU-a/18 “Comparisons in range of measurements of energy of combustion of coals with different concentrations of sulfur”
	5) The course of work on Project 780/RU/19 “Comparisons of national standard gas calorimeters on gas mixture samples”
	6) The course of work on Project 787/UZ/19 “Pilot comparisons of measurements in the field of calibration of platinum thermometers”
	7) The course of work on Project 771/MD/18 “Pilot comparisons of measurements in the field of calibration of platinum resistance thermometers at reference points in the range from the triple point of mercury to the melting point of gallium”
	8) The course of work on Project 721/AZ/17 “Bilateral supplementary comparison in the temperature range (-40-660) °C”
	9) On exclusion of Project 592/SK/13 from Working Program of TC 1.10

	10) On the correction of the COOMET Comparison Program regarding the completing the COOMET Project 642/MD/14 "Comparison of measurements in the field of calibration of industrial platinum resistance thermometers"
6.	Organization of supplementary comparisons in the field of measurement of temperature expansion coefficients
7.	On the election of Chairperson of Technical Committee TC 1.10
8.	Closure of the meeting

DECISIONS OF THE MEETING

1. On the activity of the Technical Committee of COOMET TC 1.10 in 2019-2020.

Speaker: A.I. Pokhodun (VNIIM)

Chairperson of the Technical Committee TC 1.10 A.I. Pokhodun highlighted the main direction of activity of the Committee - the practical implementation of the Agreement on the mutual recognition of national measurement standards and calibration certificates of measurements of national measurement standards, issued by NMI.

The Chairperson of TC 1.10 noted that VNIIM is the only COOMET National Institute organizing regional comparisons to evaluate the equivalence of National standards of temperature units in the range above 0 °C. Thus, the information on the equivalence of VNIIM measurement standards is the basis for evaluating the equivalence of measurement standards participating in COOMET regional comparisons.

The Chairperson of TC 1.10 drew attention to the fact that the CCT-K9 comparisons are not relevant, since made over 8 years ago. Taking into account the possibility of PTB (Germany) to control the current state of its standard based on the results of EURAMET comparisons, VNIIM requested PTB to perform bilateral comparisons, to which it received its agreement. The Chairperson from all TC 1.10 expressed his gratitude to PTB, in particular to Steffen Rudtch, for the great help in organizing and carrying out the comparisons.

The dynamics of the development of the measuring capabilities of COOMET metrological institutes in the period from 2019 to 2020 was noted. During this period, the number of CMC entries published in KCDB has increased for the metrological institutes of the countries of Belarus, Ukraine, Kazakhstan, Moldova, Georgia, the Russian Federation and Azeybarjan.

Chairperson of TC A.I. Pokhodun reported on COOMET comparisons in the field of bomb calorimetry - these are comparisons in the field of combustion energy of coals with different sulfur values. The participants of these comparisons are the institutes of the Russian Federation (pilot), Germany, Romania, Turkey, Belarus and China. The measurement protocols were received, and the preparation of the report A was started.

Along with the above mentioned comparisons, comparisons in the field of gas calorimetry were started - these are comparisons of national standards of gas calorimeters on samples of gas mixtures. The participants of the comparisons are the institutes of the Russian Federation (pilot), France and Turkey. At the moment, the technical protocol and samples have been approved.

The Chairperson of TC 1.10 reported on the results of the implementation of a new definition of Kelvin into practice in the institutes of the Russian Federation and Ukraine. At VNIIM, the creation of a standard for the unit of temperature has been completed, which makes it possible to reproduce the unit of kelvin by the method of primary thermometry and the method of conditionally primary thermometry in the range from 961.78 °C to 3200 °C. At VNIIFTRI, the creation of a temperature unit standard has been completed, which makes it possible to reproduce the unit of kelvin by the method of primary thermometry and by the method of conditionally primary thermometry in the range from 5 K to 273.16 K. At the

NSC "Institute of Metrology" there are performed the works on creating the standard for the unit of temperature, which will allow to reproduce the unit of kelvin by the method of conditional primary thermometry in the range above 961.78 °C. BelGIM is currently studying the possibility and feasibility of creating a standard that implements the new definition of the unit of kelvin.

Decision

To take note of the information on the activities of the COOMET Technical Committee TC 1.10 in 2019-2020.

2. On the activity of Technical Committee of EURAMET TC-T.

The Chairperson of TC-T EURAMET Ma Dolores del Campo Maldonado made a presentation on the structure, role of the TC-T organization and the projects that EURAMET is involved in. TC-T is a forum for scientific and technical cooperation in the field of thermometry and related quantities. TC-T contributes to the development and implementation of metrological research programs and is responsible for the implementation of activities required by EURAMET to meet the CIPM MRA.

M^a Dolores del Campo Maldonado informed that on September 1-2, 2020, an online meeting of the TC-T was held, which was attended by the Chairperson of COOMET TC 1.10 A.I. Pokhodun. At this meeting, the Chairperson of TC 1.10 presented a report on the activities of COOMET TC 1.10 in 2019.

M^a Dolores del Campo Maldonado presented the structure of TC-T, which consists of 5 groups: a working group on knowledge transfer, a working group on humidity, a working group on thermophysical quantities, a working group on CMC entries, a working group on strategy.

Several ongoing and recently completed comparisons of TC-T piloted by EURAMET members were highlighted.

M^a Dolores del Campo Maldonado has indicated EMPIR research projects:

- Real-K, launched in 2019, which aims to redefine the unit of kelvin;
- PhotOQuant, which aims to develop photonic and optomechanical sensors for the implementation of future quantum temperature standards;
- BIOFMET, which aims to develop faster, more accurate, reproducible and traceable methods for measuring the heat of solid and liquid biofuels;
- MetForTC, which will develop practical methods and devices traceable to ITS-90 for testing thermocouple drift;
- HiTrace, which will develop new methods for determining the thermophysical properties of any solid material at temperatures up to 3000 ° C, as well as launch a network of standard installations available to industry;
- INCIPIT, launched to develop metrological traceability and calibration methods for instruments for measuring liquid atmospheric precipitation;
- SimpleMeteoU, within which a system will be developed for the simplified expression of uncertainty in meteorological data in combination with a convenient graphical presentation;
- CRS, within which reference climatological stations will be created;
- COAT, which will help to improve the comparability of measurements of extreme air temperatures for meteorology.

The publications of TC-T, which are in the process of preparation, were announced: a guide to surface temperature calibrators, to calibrate radiation thermometers, to calibrate dew point, to calibrate relative humidity, to calibrate thermal diffusivity.

The Chairperson of TC-T EURAMET presented a brief overview on European

Metrology Networks (EMC). The European Metrology Networks are a tool to improve coordination within EURAMET - the way to a truly coordinated and shared metrology infrastructure. The main goal of EMC is to create a sustainable structure in fields of strategic importance for the future of European metrology, through the dissemination of knowledge and the creation of a coordinated infrastructure. The report listed the main EMC: ECVS, Energy Gases, Technologies, Mathmet, TraceLabMed, etc. The most relevant for EMC thermometry - AdvManuNet, which is under development, was highlighted. This EMC aims to strengthen the European position in advanced manufacturing by accelerating the development and implementation of innovative metrology, focusing on the needs of production and optimizing stakeholder engagement with metrology.

Decision

To take note of the information on the activities of the EURAMET TC-T Technical Committee.

3. On performing a joint meeting of the Technical Committees of COOMET TC.10 and EURAMET TC-T in 2021.

Speaker: A.I. Pokhodun (VNIIM)

Chairperson of TC 1.10 A.I. Pokhodun informed about the beginning of the practical implementation of the Memorandum of Understanding between COOMET and EURAMET. In particular, this participation of the Chairperson of COOMET TC1.10 in the meetings has become regular.

EURAMET TC-T. COOMET specialists participate in the development of guidelines for the calibration of thermometers for measuring surface temperature and calibrating radiation thermometers. Preparations for performing a joint meeting of the technical committees of COOMET TC 1.10 and EURAMET TC-T are in progress.

At the meeting of the chairpersons of the Technical Committees of COOMET and EURAMET, the dates and place of the joint meeting were agreed - from 19 to 23 April 2021, Bratislava, Slovakia. The topics of the training course that will be held within the framework of this meeting have been identified: international comparisons, CMCs, new KCDB, RMO research projects. The schedule of the meeting was approved.

Decision

To take note of the information on the joint meeting of COOMET TC.10 and EURAMET TC-T Technical Committees in 2021.

4. Activities of the Advisory Committee on Thermometry in the field of organizing comparisons of national measurement standards of units of thermophysical quantities.

Speaker: A.I. Pokhodun (VNIIM)

The Chairperson of COOMET TC 1.10, A.I. Pokhodun reported on the comparisons of the Advisory Committee on Thermometry planned in 2021:

- 1) key comparisons of triple point water ampoules (NRC pilot laboratory, Canada).
- 2) key comparisons of emitters designed to calibrate thermometers used for measuring body temperature (NIM pilot laboratory, China).

Decision

To take note of the information on the thermometry Consultative Committee comparisons planned for 2021.

5. Discussion of the progress of works on COOMET projects in the field of "Thermometry and Thermal Physics"

1) Discussion of the progress of works on COOMET Project 704/RU-a / 16 "Regional key comparisons of national standards of temperature unit at the triple point of mercury".

Speaker: Ya.E.Razhba (FSUE "VNIIFTRI").

Project Coordinator - FSUE "VNIIFTRI", Russian Federation.

The participants in the comparisons are: Belarus, Moldova, Kazakhstan, Georgia, Georgia, Germany and Russia. and FSUE VNIIFTRI. Comparisons involve the transportation of standard stick platinum resistance thermometers belonging to a specific participant in comparisons and coordinator. The scheme of comparisons provides for sequential graduation of the indicated thermometers at the triple point of mercury of the participant of comparisons, the triple point of mercury of the coordinating laboratory and recalibration of the participants.

The second stage of measurements is over. The results were sent to FSUE "VNIIFTRI" for processing.

2) Discussion of the progress of works on the COOMET Project 544 / RU-a / 11 "Regional comparisons of gas humidity standards. Dew/frost point temperature from minus 50 ° C to + 20 ° C".

Speaker: M.A. Vinge (FSUE "VNIIFTRI")

The aim of the comparisons is to determine the degree of equivalence between the participating National Metrology Institutes in the implementation of local scales for the dew/frost point of wet gas in the range from minus 50 ° C to 20 ° C. Taking into account that the Project was opened in 2011, but measurements have not yet been carried out due to the difficulty of moving the standard between the participating countries, and due to the fact that comparisons have not yet been registered in the KCDB, it was proposed to exclude the Project from the Program of comparisons of COOMET. It was also proposed in 2021 to initiate the opening of a new COOMET Project on this issue in view of the interest of COOMET countries in carrying out comparisons in the field of measurements.

3) Discussion of the progress of works on the COOMET Project 768/GE/ 18 "Comparisons of measurements of instruments of relative humidity in the range of relative humidity (30-90)% at a temperature of 23 ° C.

Speaker: A. I. Pokhodun (VNIIM)

The results and the protocol were sent for comments to the reviewer, comments were received. The remarks have been eliminated. The comparisons have been completed.

4) Discussion of the progress of works on COOMET Project 744/RU/18-ua "Comparisons in the field of measuring the calorific value of coals with different sulfur values".

Speaker: E. N. Korchagina (VNIIM)

Comparisons were registered in KCDB as COOMET.T.-S.4

A new technical protocol has been prepared. The results of interlaboratory comparative tests were processed and the average value of the mass fraction of total sulfur in the selected coal samples was obtained. Grinding and pulverization of the initial mass of each coal sample was carried out. Samples were sent to the participants. The samples were measured

by the participants, the measurement protocols were received from the participants. The preparation of the Type A report has begun.

5) Discussion of the progress of works on COOMET Project 780/RU/19 "Comparisons of national reference gas calorimeters on samples of gas mixtures".

Speaker: E. N. Korchagina (VNIIM)

It is proposed to carry out comparisons using samples of pure gases and gas mixtures in cylinders. The participants of the comparisons are: FSUE "D.I. Mendeleev FSUE VNIIM"(Russian Federation), Tubitak UME (Turkey) and LNE (France). The technical protocol was approved by the participants, the samples were prepared for shipment and customs clearance.

6) Discussion of the progress of works on COOMET Project 787 / UZ / 19 "Pilot comparisons of measurements in the field of platinum thermometer calibration".

Speaker: K.I. Bordianu (Moldova)

To confirm the equivalence of national standards of Uzbekistan, a Project was launched on pilot comparisons of measurements in the field of calibrating platinum thermometers. The participants are: INM (Moldova) and UzNIM (Uzbekistan). Measurements have been carried out in Moldova, measurements have begun in Uzbekistan.

7) Discussion of the progress of works on the COOMET Project 771 / MD/18 "Pilot comparisons of measurements in the field of calibration of platinum resistance thermometers at reference points in the range from the triple point of mercury to the melting point of gallium".

Speaker: A.I. Pokhodun (VNIIM)

Measurements have been carried out, a protocol is being formed.

8) Discussion of the progress of works on COOMET Project 721/AZ/17 "Bilateral supplementary comparison in the temperature range (-40-660) ° C".

Speaker: R. Hasanov, AzMI

The comparisons were not carried out. There is no need to continue comparisons.

9) on the exclusion of Project 592/SK /13 from the TC 1.10 work program.

Speaker: A. I. Pokhodun

In view of the fact that comparisons 592/SK/13 have not been started since 2013 and are duplicated by comparisons of COOMET 704 /RU /16, it is proposed to exclude them from the COOMET Program of comparisons.

10) On the correction of the COOMET Comparison Program regarding the completing the COOMET Project 642/MD/14 "Comparison of measurements in the field of calibration of industrial platinum resistance thermometers"

Speaker: Bordianu K.I. (Moldova)

Comparisons are completed. It is reasonable to complete officially the Project within COOMET.

Decision

To take note of the information on the status of works on COOMET Projects.

To ask the coordinator of comparisons on Project 780/RU/19 to register comparisons in KCDB and send to the COOMET Secretariat the form of the agreed COOMET Project for updating the status of comparisons in the COOMET Program of comparisons.

To ask the coordinator of comparisons on Project 787/UZ/19 to send to the COOMET Secretariat the form of the agreed COOMET Project for updating the status of comparisons in the COOMET Program of comparisons.

To ask the coordinator of comparisons on Project 771/MD/18 to send to the COOMET Secretariat the form of the final report on the Project of COOMET after agreeing the results of comparisons with all participants.

To ask the coordinators of the completed comparisons on Projects 768/GE/18 and 642/MD/14 to prepare and send to the COOMET Secretariat the forms of final reports on Projects for the subsequent updating of the COOMET Program of Comparisons.

To exclude Projects 544/RU/11, 592/SK/13 and 721/AZ/17 from the COOMET Program of Comparisons due to their irrelevance.

6. On the organization of supplementary comparisons in the field of measurements of temperature expansion coefficients.

Speaker: S. V. Kondratyev (VNIIM).

S.V. Kondratyev reported that the comparisons will be approved by the Working Group on thermophysical quantities of the Consultative Committee on Thermometry. At the level of absolute measurements, the participants are planned to be Russia, Japan and China. France and Great Britain, which do not have equipment for absolute measurements, will take part in comparisons at the level of relative measurements. The temperature range from 273.15 K to 773.15 K was determined; the material of the measures for absolute measurements was leucosapphire, siall. In view of the extensive experience of this kind of work, FSUE "D.I. Mendeleev FSUE VNIIM" will act as a pilot laboratory in comparisons and plans to create measures for carrying out absolute measurements. The comparison program is under development.

The speaker briefly presented the National primary standard of the unit of the linear expansion temperature coefficient at D.I.Mendeleev FSUE VNIIM ". The range of the above mentioned standard is from 90 K to 3000 K and is a group of interference dilatometer installations and an installation that includes a pyrometer for measuring the temperature of the sample, a high-temperature furnace, an optical device for measuring the elongation of the sample. The representative of the Turkish National Institute, Dr. Nasibli G. expressed interest in the comparisons.

Decision

To take note of the information on the organization of supplementary comparisons in the field of measuring the temperature coefficients of linear expansion.

To take note of the interest of the Turkish National Institute, Dr. G. Nasibli in the comparisons.

To ask the coordinator of these comparisons to register comparisons in KCDB (taking into account the inclusion of UME (Turkey) in the list of participants), as well as to prepare and send to the COOMET Secretariat a form of the proposed COOMET Project for registering comparisons and including them in the COOMET Program of comparisons.

7. On the election of the chairperson of the Technical Committee of TC 1.10.

Head of COOMET Secretariat N.D. Liakhova informed that in April 2020 COOMET made a decision to amend the COOMET Memorandum of Cooperation, according to which

the TC Chairperson can be the same person for a period of 4 years with the possibility of one-time extension. In parallel with the decision to amend the Memorandum, amendments were made to the Document D5 "Model Regulations on the Structural Body", according to which the election of the Chairperson of the TC is carried out 1 year before the expiration of powers. Therefore, it was proposed to TC 1.10 members to perform online voting on the issue of extending the powers of the Chairperson of TC 1.10 A.I. Pokhodun.

This voting was organized using the capabilities of the Zoom platform.

Results of voting: all participants of the 17th meeting (online) of the COOMET Technical Committee TC 1.10 "Thermometry and Thermal Physics" supported the idea to extend the powers of the Chairperson of TC 1.10 A.I. Pokhodun for the next 4 years period from April 2021 to April 2025.

Decision

To take note of the information on the results of online voting on the issue of extending the powers of the Chairperson of TC 1.10 A.I. Pokhodun and to apply to the COOMET Committee for the extension of his powers for a period from April 2021 to April 2025.

8. Closing of the meeting

Chairperson of COOMET Technical Committee TC 1.10 "Thermometry and Thermophysics" Prof. A Pokhodun thanked the participants of the meeting for their active work.

Chairperson of TC 1.10

A. Pokhodun

Secretary of TC 1.10

S. Fil