

2013-05-21

1. General Aspects

The Technical Committee for Flow (TC-F) is concerned with issues that are relevant to industry, regulation and trade involving the measurement of fluid quantity and related measurements derived from it (e.g. energy). The measurement of fluid quantities focuses on the measures of water, hydrocarbon liquids, air and natural gas but also includes all other fluids and mixtures of fluids.

The first TC-F meeting was held in East Killbride in 1988 with less than 10 participants. In Delft, on March 2012, 45 delegates from 25 countries attended the last TC-F meeting. The TC-F community increases and, at the moment, there are 29 contact persons and 52 flow experts involved.

The TC-F members are very active in the developments of flow research facilities but also in facilities for the type approval and support for legal metrology in the respective countries. Routine work for industrial and laboratory costumers is also a big part of these community activities.

2. Projects and comparisons

There is a total of 73 EURAMET projects in the Technical Committee for Flow, where 82 % of this projects are comparisons, 15 % are research and 3 % consultation. Actually 54 projects are completed, 2 cancelled and 17 active projects (12 comparisons and 5 research).

In 2013, so far, three EURAMET projects were proposed: 1273 - Comparison of a 100 ml Volumetric Flask, 1270 - Determination of exemplary dataset of spatial fluid velocity profiles and components of the turbulent Reynolds stress tensor in air and water downstream to special pipe configuration and 1267 - Harmonization of the uncertainty budgets and calibration methods for liquid flow standards.

Four EURAMET projects were completed: 1247 - Bi-Lateral Intercomparison of Oil Flow Facilities between NEL and FMC Technologies, 1161 - Intercomparison on water/heat meter calibration at 50 °C, 6 - 25 L/h, 1158 - Harmonization of the uncertainty budget and calibration method for volumetric volume calibration and 1157 - Inter-comparison of 1000 L proving tank.

The detailed information about the TC-F projects can be consulted in the EURAMET website.

A new template for evaluation of comparison results and comparison reports will be developed in order to harmonize reports and result calculations.

3. Key Comparisons

The EURAMET TC-F members are very active at the BIPM key comparison (KC) level, where 5 of 6 KCs were organized by EURAMET TC-F members and the European participation was also relevant.

There are 6 active KCs in the subfield of flow at the BIPM KCDB:

- CCM.FF-K1 – Water flow
- CCM.FF-K2 – Liquid hydrocarbon Flow
- CCM.FF-K3 – Air Speed
- CCM.FF-K4 – Liquid Volume
- CCM.FF-K5 – High pressure gas flow
- CCM.FF-K6 – Low pressure gas flow

There are 5 BIPM/EURAMET supplementary comparisons in the field of fluid flow, two of them were published in 2013.

- EUROMET.FF.M.S1 - Comparison of piston and bell provers (2008)
- EURAMET.FF.M.S2 - Comparison of water flow calibration (2013)
- EUROMET.FF.M.S3 - Low pressure gas flow (pressure < 4 105 Pa) (2008)
- EUROMET.FF.M.S4 - Air Speed (2008)
- EUROMET.FF.M.S - LDA-based intercomparison of anemometers (2013)

4. CMCs

A CMC revision group was created during the 2012 TC-F meeting. In December 2012 a new CMC revision procedure was created by the CMC TC-F revision group and a new CMC process started with the submission of 6 countries. Three sets of CMCs were posted in the JCRB for RMO revision EURAMET.M.33.2013, EURAMET.M.34.2013 and EURAMET.M.35.2013.

Within the WGFF group the procedure - WGFF Guidelines for CMC Uncertainty and Calibration Report Uncertainty was approved in February 2013.

CMCs from other RMOs were reviewed, namely COOMET.15.2013.

Harmonization of evaluation criteria of CMCs within the WGFF should also be established. A guideline on CMC revision criteria should be developed by the WGFF. An initial proposal based on the EURAMET TC-F revision protocol was already submitted by the TC-F chair to the WGFF Chair, John Wright, and is now under discussion.

5. Activities of the Sub-Committees

The TC-F group is divided in three subgroups, Gas flow, Liquid flow and Volume, but during the 2013 meeting it was decided to create a new subgroup: Fluid speed.

Fluid speed is a quantity that is attracting increasing interest from the metrological community as well as from the industry; more and more NMIs are developing test rigs for the measurement of this quantity; this activity is driven by the fact that several industries, in the most various fields (e.g. wind energy generation, chemical industries, pharmaceutical industries, etc.), are requiring calibrated anemometers for their quality systems. On the other hand, activities about this quantity were until now performed under the gas flow subgroup; though, the two fields have several differences, mainly fluid speed measurement is an intrinsically local quantity while flow rate is an integral quantity; it is therefore wise from a technical standpoint to split the two activities.

Finally, it is expected that the group will have a consistent activity as there are already several EURAMET Projects ongoing.

The subgroups meetings are held separately during the TC-F meeting. Each subgroup convenor decides the agenda and the subjects to be debated based on participants input.

- **Gas Flow subgroup** – Convenor - Bodo Mickan from PTB

The main topics of discussion were the status of the current project in the field of gas flow and the harmonization of comparisons results templates and inconsistency analysis. The proposal regarding the split of fluid speed from SG Gas was agreed and this information was sent to EURAMET for approval.

- **Liquid Flow subgroup** - Convenor - Petra Milota from BEV

In the liquid flow subgroup meeting, results of EURAMET projects and KCs were discussed.

- **Volume and liquid proprieties** - Convenor - Zoe Metaxiotou from EIM

In the volume and liquid proprieties subgroup meeting, the results of the running comparisons were presented. Based on the results of the key comparison CCM.FF.K4.2.2011- Volume comparison of 100 µL micropipette it was decided to develop a new EURAMET Guide on calibration of micropipettes. A new regional comparison in the field of micropipettes was also proposed. The members of volume subgroup decided to

change the name of the sub group to volume and remove proprieties of liquids; this information was sent to EURAMET for approval.

6. EMRP

Participants from the TC-F are involved in several EMRP projects: ENG03 - Metrology for Liquefied Natural Gas, ENG09 – Metrology for Biofuels, ENG06 -Metrology for Improved Power Plant Efficiency and HLT07 - Metrology for drug delivery.

The LNG project received the EURAMET EMRP impact price.

A new EMRP task force with 18 participants was created in January 2013 in order to facilitate interaction between NMIs to write and submit PRTs for the new EMRP 2013 call (Energy II and Environment II). Peter Lucas from VSL, the coordinator of the task group, presented the goals and achievements of this task force as well as the motives for creating this work group.

During the web meetings organized by the task leader several ideas for PRTs were proposed. 10 different PRT proposals were developed and were presented in the 2013 meeting.

7. Roadmap 2012-2020

It was decided to organize a group web meeting in June 2013 to discuss the publication of the TC-F roadmap.

8. Guides

Due to the lack of international documentation on calibration of volume measurements using the volumetric method the EURAMET TC-Flow decided to create some guidelines and try to harmonize procedures and concepts. A research project was created in 2010, EURAMET project 1158. Several volume specialists from different European NMIs participated in the elaboration of this document. Several topics are explained in detail in this guide: Specific definitions related with volumetric calibration, general techniques, e.g. ambient and water calibration conditions, cleaning, meniscus adjustment and expansion coefficient of water, the calibration procedure using the filling method and using the withdrawing method, the mathematic equation for determination of volume, the procedure for estimating measurement uncertainty and a practical case study is described. The main users of this guide will be accredited laboratories, industry and national metrology laboratories that are performing measurements on volume of liquid.

This guide was published in April 2013 as EURAMET cg -21 – Guidelines on the Calibration of Standard Capacity Measures using the Volumetric Method.

9. Meetings

The annual meeting of the TC-F was held in Delft, The Netherlands from 12th to 14th of March of 2013. The meeting was hosted by the VSL, the National Metrology Institute of the Netherlands.

In the meeting several issues were discussed, mainly:

- Results from comparisons
- WGFF group and KCs
- CMCs and DUT uncertainties
- EMRP projects, proposals and funding
- EMPIR
- New facilities, developments and projects

The next TC-F meeting will be in Torino, Italy from 11th to 13th of March and will be hosted by INRIM.

10. Strategic planning

The 2013 TC-F meeting evidenced the need of harmonization of CMC revision criteria within the WGFF group and therefore a new procedure was created and is now under discussion in the WGFF group. In the beginning of the year the TC-F group decided to create an EMRP task force to develop new PRTs in order to try to be more successful in the future ERMP call, Energy II and Environment II. The CMC revision is now stabilized and every year the NMI has a chance to submit new CMCs.

11. Outlook for 2013

New JRP proposals for EMRP based on the new TC-F roadmap.
One new supplementary comparison will be proposed for 2013, 1000 L proving tank calibration.
Development of a WGFF CMC harmonized revision procedure.
Submission of new EURAMET projects.
Development of a result and report template for flow comparisons.
Development of two new guides.
New subgroup of fluid speed will start working formally.

21st May 2013

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