

## **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 Vienna, on March 2012, 53 delegates from 25 countries attended the last TC-F meeting. The TC-F community increases and, at the moment, there were 31 contact persons and 57 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 67 EURAMET Projects in the Technical Committee for Flow, where 84% of this projects are comparisons, 13 % are research and 3% consultation. Actually 50 projects are completed, 2 cancelled and 15 active projects (11 comparisons and 4 research).

In 2012, two EURAMET project were proposed: 1225 - Comparison of very low air speed standard facilities (0,05 – 1)m/s and 1224 - Comparison VSL - PTB Volume flow for Natural Gas under High Pressure and two EURAMET projects were concluded: 1159 - Volume calibration of a 100 microliter micropipette and 827 - LDA-based intercomparison of anemometers

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

## **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

## **4. CMCs**

A CMC revision group was created during the 2012 TC-F meeting.

A complete CMCs revision process started in 2012 with the submission from 13 countries. Two sets of CMC from 7 countries were posted in the JCRB for RMO revision; EURAMET.M.27.2012 and EURAMET.M.28.2012. A third set will be posted until the end of May with CMCs from 6 countries.

The revision process needs still to be improved in order to be more efficient and a repeated procedure has to be applied in the future and will be developed by the CMC revision group.

The Gapfinder (excel statistic tool) was reactivated, this is a very useful tool to update and review the CMCs entries and the CMC review group will use it in the future.

Within the WGFF group, a debate regarding DUT uncertainty and CMC revision criteria is undergoing. EURAMET TC-F proposed the development of a revision procedure with very well defined criteria. This procedure will be presented and discussed during the next WGFF meeting to be held in Colorado Springs from 18<sup>th</sup> to 19<sup>th</sup> June 2012. Also it was proposed by the Chair of the WGFF, John Wright, to review all Flow CMCs from all RMOs during this year of 2012.

Several CMCs from other RMOs were reviewed and approved by the TC-F: APMP.M.31.2012 from KRISS Korea, SIM.M.19.2011 from NIST USA, SIM.M.17.2011 from INTI Argentina, APMP.M.30.2011 from VIM Vietnam and SIM.M.23.2012 from NIST USA.

## 5. Activities of the Sub-Committees

The TC-F group is divided in three subgroups. This division allows an active debate on specific questions and a close contact and change of experiences and knowledge between participants.

The subgroups meeting 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 Mikan from PTB

During the gas subgroup meeting in 2012, the results of EURAMET projects and KCs were discussed. The DUT-uncertainty values for gas flow and airspeed were also discussed. A new proposal regarding the split Airspeed from SG Gas was proposed and will be consider by the participants during 2012.

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

In the liquid flow subgroup meeting, results of EURAMET projects and KCs were discussed. A consensus on merging mass and volume CMCs in the liquid subgroup was achieved.

- **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, two new possible EURAMET comparisons on glassware in the range of one liter and in the category of piston operator dispenser of 50 mL were discussed. A new EURAMET Guide on calibration of mcropipettes was also discussed.

## 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.

Three PRT EMRP proposals for the EMRP Call 2012 - Industry, SI Broader Scope & Open Excellence were presented:

- CDF Studies of particle-laden multiphase flows in hydraulic and pneumatic conveying – EIM/Aristotle University
- Towards the calibration-free flowmeter - TUVNEL
- Traceability of gas flow measurement for non-conventional applications – PTB

## **7. New TC-F roadmap 2012-2020**

The TCs of EURAMET were asked to help in the preparation of the new EMPIR programme through the development of a new roadmap based on new scientific-technical goals.

The new TC-F roadmap was developed in April-May 2012 and has the following goals:

- Innovative metrological tools for biomedical traceability
- Development and improvement of cost-effective complex flow measurements
- Improved control and enhanced metering of energy-carrying fluids
- Development of traceable measurement technology for emission/waste reduction, monitoring and trade
- New fundamental standard for absolute molecule counting

## **8. Meetings**

The annual meeting of the TC-F was held in Vienna, Austria from 13<sup>th</sup> to 15<sup>th</sup> of March of 2012. The meeting was hosted by the Austrian Metrology Service (BEV). 53 Delegates from 25 countries attended the meeting. In the meeting several issues were discussed, mainly:

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

The next TC-F meeting will be in Delft, The Netherlands from 12<sup>th</sup> to 14<sup>th</sup> of March and will be hosted by VSL.

## **9. Strategic planning**

The 2012 TC-F meeting evidenced the need of harmonization of CMC revision criteria within the WGFF group and therefore a new procedure will be created.

The TC-F CMC revision process also needs to be improved in order to be more efficient and a repeated procedure has to be applied in the future.

The new roadmap will help the TC-F vision and research activities in the future, including the submission of new PRT proposals for EMRP and EMPIR.

## **10. Outlook for 2013**

New PRT proposals for EMRP based on the new TC-F roadmap.

Development of a formal and repeatable EURAMET TC-F CMC revision procedure.

Submission of new EURAMET projects.

Publication of a new EURAMET guide on volumetric measurements.

WGFF procedures agreement on CMC revision criteria.

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Elsa Batista  
EURAMET TC-F Chair