TC Chair Annual Report 2016 - 2017

TC for Length (L)
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1. General Aspects

EURAMET TC-L currently has contact persons from 33 EURAMET members and 4 named observers: 1 from a DI, 2 from liaison NMIs (EG, ZA) and 1 from liaison organization (BIPM). In the last meeting held at VSL in Oct. 2016 TC-L had 35 participants, 27 contact persons, 1 Convenor of WG on EMPIR, 2 liaison contacts (NMISA, SASO NMCC), and 5 guests including the EMRP/EMPIR program manager and 1 guest from the hosting NMI.

2. Projects

In the period under review there were a total of 22 active projects with 7 being MRA comparisons. At the last TC-L meeting 2 new project proposals were discussed.
Two of the long-term TC-L projects are related to conference series, organized by TC-L at different locations with colleagues from PTB serving as main contact:
- EURAMET #1343 MacroScale conference series
- EURAMET #1342 NANOSCALE conference series

These triannual conferences collect length metrology researchers globally from NMIs, academia and industry.

3. Comparisons

3.1 KeyComparisons

The current status of EURAMET length key comparisons, in line with the CCL-KC, is as follows. Changes since the last GA meeting are marked in red in the status column.

Designation	Title	Status
EURAMET.L-K1.2011	Gauge blocks	Final & Executive report, KCDB
EUROMET.L-K2	Long Gauge blocks	Executive report, KCDB
EURAMET.L-K3.2009	Angle comparison using an autocollimator	Draft A.2
EURAMET.L-K3.2009.2	Bilateral comparison using AC	Ongoing
EURAMET.L-K4.2015	Diameter standards	Started
EUROMET.L-K4.2005.1	Diameter standards	Draft B1
EURAMET.L-K5.2016	Step gauge	Ongoing
EUROMET.L-K6	2D-CMM artefacts	Final & Executive report, KCDB
EUROMET.L-K7.2006	Line scales	Final & Executive report, KCDB
EURAMET.L-K8	Surface texture - Roughness	Final, KCDB

3.2 Supplementary comparisons

Recently active supplementary comparisons:

Designation	Title	Status
EURAMET.L-S22	Calibration of gauge blocks by mechanical comparison	Final report, KCDB
EURAMET.L-S23	High precision roundness by error separation technique	Final report, KCDB

EURAMET.L-S25	Comparison of pocket-type laser distance measurement instruments (EDMs)	Final report, KCDB
EURAMET.L-S26	Measurement of groove depth standards in the range 1 µm up to 1 mm	Started

3.3 Corrective actions due to insufficient performance in KC/SC

CCL guidance is that so-called executive reports are made after each KC/SC by pilot and accepted by participants and RMO/CCL. In these reports those laboratories with problems to demonstrate their CMC capability are listed and the nature of the problem is explained. If corrective actions have been performed they are also listed. In the annual TC-L meetings any pending issues are discussed. A table is maintained and updated by TC-L where all corrective actions are listed. The DECISION CCL 2 (2015) – '*Procedure for discrepant result corrective actions*' describes the responsibilities: 'the NMI proposes corrective actions which are agreed by the RMO (e.g. TC-L) within 90 days, informs the pilot of these (for inclusion in the Executive Report) and then implements them'.

4. CMCs

An overview of the past (after 2012) and present CMC submission is given in the table below. Red entries changed status during the period reported.

Designation	Comment	Status
EURAMET.L.12.2012	7 CMCs / 1 country	published, 2012-12-08
EURAMET.L.13.2012	11 CMCs / 3 countries	published, 2013-02-26
EURAMET.L.14.2013	14 CMCs / 3 countries	published, 2013-08-05
EURAMET.L.15.2014	26 CMC / 8 countries	published, 2014-07-21
EURAMET.L.16.2015	49 CMCs / 8 countries	published, 2015-10-15
EURAMET.L.17.2016	47 CMCs / 11 countries	published, 2016-10-05
EURAMET.L.18.2017	43 CMCs / 7 countries	Inter-RMO review

During the reporting period 1 CMC set from other RMOs was treated by TC-L.

5. Activities of the Subcommittees

There are no sub-committees in TC-L.

6. Participation in EMRP/ EMPIR

In the 2016 EMPIR calls (Energy, Environment) there were no funded JRPs with direct connection to TC-L.

Length related accepted JRPs of EMRP 2010, 2011, 2012, 2013 and of EMPIR 2014 and 2015 2016 calls are listed below, changes to status of last year are indicated in red:

Call	Project name	Status
EMRP 2010; Metrology for industry	Optical and tactile metrology for absolute form characterization	Finished
	Dynamic Mechanical Properties and Long-term Deformation Behaviour of Viscous Materials	Finished
	Thermal design and time-dependent dimensional drift behaviour of sensors, materials and structures	Finished

	Metrology of Small Structures for the Manufacturing of Electronic and Optical Devices	Finished
	Metrology to Assess the Durability and Function of Engineered Surfaces	Finished
	New generation of frequency standards for industry	Finished
EMRP 2011; SI broader scope	Traceability of sub-nm length measurements	Finished
EMRP 2011; New Technologies	Traceable measurement of mechanical properties of nano-objects	Finished
	Traceability for computationally-intensive metrology	Finished
EMRP 2012; Metrology for industry	Large volume metrology in industry	Finished
	Metrology for movement and positioning in six degrees of freedom	Finished
	Multi-sensor metrology for microparts in innovative industrial products	Finished
	Traceable in-process dimensional measurement	Finished
EMRP 2012; SI broader scope	Angle metrology	Finished
	Metrology for long distance surveying	Finished
	Crystalline and self-assembled structures as length standards	Finished
EMRP 2013; Energy II	Traceable measurement of drive train components for renewable energy systems	Started
EMPIR 2014; Industry	Metrology for highly-parallel manufacturing	Started
	Metrology for length-scale engineering of materials	Started
	Metrology for the photonics industry	Started
EMPIR 2015; Health	Metrology for additively manufactured medical implants	Started
EMPIR 2015; SI	Traceable three-dimensional nanometrology	Started
	Reference algorithms and metrology on aspherical and freeform lenses	Started

There are also other approved projects with some length related research:

Call	Project name	Status
EMRP 2011; New Technologies	Traceable characterisation of nanostructured devices	Finished
	Metrology with/for NEMS	Finished
	Metrology of electro-thermal coupling for new functional materials technology	Finished
EMRP 2011; Health	Metrological characterisation of microvesicles from body fluids as non-invasive diagnostic biomarkers	Finished
EMRP 2012; Metrology for industry	Novel electronic devices based on control of strain at the nanoscale	Finished
	Metrology to enable high temperature erosion testing	Finished
EMPIR 2014; Industry	Metrology for manufacturing 3D stacked integrated circuits	Started
	Metrology for innovative nanoparticles	Started
EMPIR 2015; SI	Nano-scale traceable magnetic field measurements	Started

7. Capacity Building: Activities of the last year and future needs

Tanfer Yandayan from Tübitak UME, TR, acts as TC-L contact person for capacity building issues since summer 2016. Tanfer informed TC-L contacts about the RPOT and RMG calls and other capacity building instruments. He also coordinated submissions of 2 JRP's from TC-L for the RPOT call in 2017.

8. Meetings

The following list shows the TC-L meetings and related activities over the last 3 years:

- 2014 TC-L CP meeting, 27-28 October 2014, BEV, Wien, Austria
- Macroscale 2014 Conference, 28-30 October 2014, BEV, Wien, Austria

This conference was arranged by BEV and PTB in co-operation with CCL and EURAMET TC-L. During or around this conference many JRPs had their project meetings

- 2015 TC-L CP meeting, 26-28 October 2015, CEM, Tres Cantos, Spain

The annual meeting of 2015 was followed by a TC-L EMPIR workshop and a workshop on the results of JRP ‚Angle metrology'

- 2016 TC-L CP meeting, 17-18 October 2016, VSL, Delft, Netherlands

The annual meeting of 2016 was followed by a TC-L EMPIR open workshop and meetings of the CCL WG-MRA and the CCL WG-Nano. In March the Nanoscale 2016 conference was organized in cooperation with the Technical University in Wroclaw, PL: => *http://www.nanoscale.ptb.de/*

- 2017 TC-L CP meeting, 16-17 October 2017, VTT-MIKES, Espoo, Finland

The annual TC-L meeting of 2017 will be followed by the Macroscale conference and a meeting of the CCL WG-MRA in the same week at VTT-MIKES

9. Issues

The topic of 'generic 1D' CMCs was discussed within TC-L and within CCL-WG-MRA as well in the reporting period. This topic addresses to provide guidelines for the specification (and review) of CMC entries for 1D measurands like e.g. distances or diameters on different type of measuring objects (cylinders, spheres or workpiece-like standards) using multi-purpose measuring instruments like coordinate measuring machines (CMM).

10. Strategic Planning

During 2016 TC-L contributed to the KCDB 2.0 discussion. Several ideas put forward for KCDB 2.0 are similar to what EURAMET TC-L and CCL-WG-MRA (and its predecessor CCL-WGDM) have implemented already some time ago as guidelines and procedures for the length community (restricted comparison portfolio based on key techniques, Executive Reports, …), see:
=> *http://www.bipm.org/wg/AllowedDocuments.jsp?wg=CCL-WG*

11. Outlook for 2017/2018

Annual TC-L meeting 16.-17. Oct. 2017 at VTT-MIKES. Preparation for EMPIR 2017 (JRP's) and 2018 calls (PRT's). Macroscale conference in Oct. 2017 at VTT-Mikes, FI:
=> *http://www.macroscale.org/*