

1. General Aspects

EURAMET TC-L has currently contact persons from 34 EURAMET members and 5 named observers: 1 from a DI, 3 from liaison NMIs (EG, RSA and IL) and 1 from liaison organisation (BIPM). In the last meeting TC-L had 39 participants, 28 contact persons, 5 observers, 4 guest and 2 additional representatives from host organisation. As observers there were representatives from Ukraine, Saudi-Arabia and South Africa.

2. Projects

In the period under review there were a total of 28 active projects with 13 being MRA comparisons. In last TC-L meeting 9 new project proposals were discussed. Two of the new projects are related to conferences:

- EURAMET #1343 MacroScale conference series, PTB
- EURAMET #1342 NANOSCALE conference series, PTB

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

3. Comparisons

Key comparisons

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

Designation	Title	Status
EURAMET.L-K1.2011	Gauge blocks	draft a
EUROMET.L-K2	Long gauge blocks	executive report, kcdb
EURAMET.L-K3.2009	Angle comparison using an autocollimator	in progress
EURAMET.L-K3.2009.1	Angle comparison, Bilateral	draft b
EUROMET.L-K4.2005	Diameter standards	final & executive reports, kcdb
EUROMET.L-K4.2005.1	Diameter standards, follow-up	in progress
EUROMET.L-K5. 2016	Step gauge	planning
EUROMET.L-K6	2D-CMM artefacts	final & executive reports, kcdb
EUROMET.L-K7.2006	Line scales	final & executive reports, kcdb
EUROMET.L-K7.2014	Line scales, bilateral	in progress
EURAMET.L-K8	Surface texture - Roughness	draft b
EURAMET.L- K8.2013	Surface texture - Roughness	draft a



Supplementary Comparisons

Recently active supplementary comparisons:

Designation	Title	Status
EURAMET.L-S20	Comparison of laser distance measuring instruments	final & executive reports, KCDB
EURAMET.L-S21	Comparison of parallel thread gauges	final report
EURAMET.L-S22	Calibration of gauge blocks by mechanical comparison	in progress
EURAMET.L-S23	High precision roundness by error separation technique	in progress
EURAMET.L-S24	Involute Gear Standards	final & executive reports, KCDB

Corrective actions due to bad 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 annual TC-L meetings we go through pending issues and update a table where problems are listed. The table can be found from here: <http://www.euramet.org/index.php?id=855>.

4. CMCs

An overview of the past (after 2011) and present CMC submission is given in the table below. **Red** entries changed status during the period reported.

Designation	Comment	Status
EURAMET.L.10.2011	29 CMCs / 8 countries	published, 2011-08-18
EURAMET.L.11.2011	47 CMCs / 11 countries	published, 2012-10-12
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	inter-regional review

During 2014 a total of 1 CMC sets from other RMOs were treated by TC-L (AFRIMETS.L.2.2014).

5. Activities of the Sub-Committees

There are no sub-committees in TC-L.

6. EMPIR

In the 2014 EMPIR call, Industry there were 12 JRPs with connection to TC-L. 5 of them were selected for funding.

During the 2014 TC-L updated the TC-L Strategic Research Agenda. The latest version can be found here:

<http://www.euramet.org/index.php?id=sra>

Length related accepted JRPs of EMRP 2010, 2011, 2012, 2013 and EMPIR 2014 calls are listed below:

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	started
EMRP 2011; New Technologies	Traceable measurement of mechanical properties of nano-objects	started
	Traceability for computationally-intensive metrology	started
EMRP 2012; Metrology for industry	Large volume metrology in industry	started
	Metrology for movement and positioning in six degrees of freedom	started
	Multi-sensor metrology for microparts in innovative industrial products	started
	Traceable in-process dimensional measurement	started
EMRP 2012; SI broader scope	Angle metrology	started
	Metrology for long distance surveying	started
	Crystalline and self-assembled structures as length standards	started
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	contract negotiation
	Metrology for the photonics industry	contract negotiation

There are approved projects with some length related research:

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

7. Meetings

- 2013 TC-L CP meeting, 21-22 October 2013, PTB, Braunschweig, Germany
- The annual meeting of 2013 was followed by open EMRP Workshop and EMPIR workshop
- 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 have their project meetings

Next occasions:

- 2015 TC-L CP meeting, 26-28 October 2015, CEM, Tres Cantos, Spain
The annual meeting of 2015 will be followed by TC-L Workshop

8. Outlook for 2015

New JRPs for EMPIR 2015 call. Nanoscale conference early 2016.

Antti Lassila
TC-Length Chair, May 22nd, 2015

Appendix 1. Active EURAMET TC-L projects.

1360	Bilateral comparison in surface texture - roughness	LNE	comparison
1321	Bilateral comparison in angle	LNE	comparison
1320	Bilateral comparison in line scale	LNE	comparison
1303	On-site visits by external technical experts in the fields of electricity and magnetism, thermometry, time and frequency and length	FTMC	consultation
1365	Key Comparison EURAMET.L-K5.2016 Calibration of a Step Gauge	NPL	comparison
1354	Comparison of pocket-type laser distance measurement instruments (EDMs))	CEM	comparison
1343	MacroScale conference series	PTB	research
1342	NANOSCALE conference series	PTB	research
1299	Follow-up of Euromet L-K4.2005	VSL	comparison
1272	Phase correction for interferometric measurement of gauge blocks	CMI	research
1269	Comparison of high precision roundness measurements	CEM	comparison
1254	Calibration of gauge blocks by mechanical comparison	DTI	comparison
1245	Key comparison on surface roughness standards	METAS	comparison
1242	Measurement of areal roughness parameters	PTB	research
1239	Measurement of surface roughness by AFM	PTB	research
1237	Calibration of Short Gauge Blocks by Mechanical Comparison	UME	consultation
1223	Supplementary Comparison of Parallel Thread Gauges	HMI/FSB-LPMD	comparison
1218	EURAMET.L-K1.2011: Calibration of Gauge Blocks by Interferometry	BEV	comparison
1169	Comparison of laser distance measuring instruments	GUM	comparison
1088	Towards truly 3D metrology for advanced micro-parts	VSL	research
1087	Average diameter of polymer particles with spherical form	JV	research
1074	EURAMET.L-K3a.2009: Angle comparison using an autocollimator	PTB	comparison
1068	TC-L initiative to archive data of Key and Supplementary Comparisons	BEV	research
1063	EURAMET link to the CCL key comparison CCL-K11	MIKES	comparison
1003	Intercomparison of Measurements on Surface Texture Standards	LNE	comparison
868	Tip sample interactions in scanning probe microscopy	NPL	research
866	Interferometric calibration of microdisplacement actuators	INRIM	research
672	Determination of form/topography of high-quality flats	PTB	research