



Report of APMP TCM

Dr. Koji OGUSHI

20th CCM Meeting, 26 June 2025



Structure & meetings



- TCM Chair: Dr. Koji OGUSHI (NMIJ)
- TCM Vice Chair: -----
- TCM Secretary: Dr. Junfang ZHU (NMIJ)
- **Working Groups**
 - Working Group for Mass and Density (WGMD)**
 - WGMD Chair: Dr. Jian WANG (NIM)**
 - Working Group for Pressure and Vacuum (WGPV)**
 - WGPV Chair: Dr. Hiroaki KAJIKAWA (NMIJ)**
- Quantities: Mass, Density, Force, Torque, Pressure, Vacuum, Hardness, and Gravity
- 32 organizations from 31 economies

The last TCM meeting was held at NPL, India, from 23 to 26 November 2024.

Projects (R&D, guides, training etc.)



TCI Project – applied

Title of the Project: Training course on gravity measurement

Overseer: Dr. Maryness I. Salazar (NMLP-ITDI)



Summary: Some developing economy NMIs rely on outdated gravity calculation methods, which lack the precision required for national metrology institutes. Accurate gravity (g) measurements are essential for reliable laboratory results and industrial development. To address this, NMIs need both absolute and relative gravity data. As many NMIs will need to adopt these techniques, initial steps should include technical training. The proposed project activities are: (1) hands-on training in absolute gravity measurement, and (2) training in relative gravity measurement.

Project participant economies:

Philippines, Bangladesh, Cambodia, Mongolia, Nepal, Papua New Guinea, and Sri Lanka.

Gravity expert: Dr. In-Mook Choi (KRISS)

Projects (R&D, guides, training etc.)



APMP DEC - CMC Task Force Program to support the achievement of CMCs (2022 - 2025)

We are supporting the DEC initiative for establishing CMCs in **Mass** for the developing economies (JNMI, Jordan; MUSSD, Sri Lanka; NMC, Cambodia; BSTI, BRiCM Bangladesh, NBSM Nepal).



**Dr. Jian Wang,
NIM China**



Dr. Nita, NPLI India



**Dr. Y. H. Fung,
MSL New Zealand**



**Ms. Rungsiya Sukhon,
NIMT Thailand**



**Dr. Nidhi Singh
NPLI India**

Online trainings were conducted from 2022 to 2023.

Now, trainees are preparing or are in the process of applying for the CMC applications.

In 2025, Mongolian NMI wants to join this task force program. We will call for volunteer soon.

CIPM MRA: KCs & CMCs



- Key and Supplementary Comparisons

Status of APMP TCM Key and Supplementary Comparison			
Comparison Identifier	Measurement period	Pilot institute	Status
APMP.M.P-S1	2003 - 2005	CMS/ITRI	Abandoned
APMP.M.G-S1	2012	NIM	Abandoned
APMP.M.MM-S1	2012 - 2013	KRISS	Approved
APMP.M.P-K15	2013 - 2014	NMIJ/AIST	Report in progress, draft A
APMP.M.F-K3.a	2013 - 2017	NIM	Measurements completed
APMP.M.P-K4	2015 - 2016	KRISS	Report in progress, draft A
APMP.M.P-K7.2	2015 - 2016	NIMT	Approved for equivalence
APMP.M.P-S7	2015	NIMT	Approved
APMP.M.F-K2.1	2018	KRISS	Approved for equivalence
APMP.M.H-S7	2019	KRISS	Planned
APMP.M.M-S2	2019	NIMT	Protocol complete
APMP.M.F-K3.b	2019 - 2020	NIM	Measurements completed

CIPM MRA: KCs & CMCs



- Hybrid Comparisons

Status of Hybrid Comparisons, 2024, 2025

Comparison Identifier	Quantity	Applicant-NMI	Issued-NMI	Status
APMP.M.H1.2024	Hardness	NIMT	INRIM	Measurement completed: 2025/01/29
APMP.M.H2.2024	Hardness	NIMT	INRIM	Draft reported: 2025/06/04
APMP.M.H3.2024	Mass	NMC	MSL	Proposed: 2024/07/26
APMP.M.H4.2024	Mass	NMIA	KRISS	Measurement completed: 2025/02
APMP.M.H5.2024	Pressure	MUSSD	KRISS	Report submitted: 2025/06/16
APMP.M.H1.2025	Force	NMIA	PTB	Proposed: 2025/3/17

CIPM MRA: KCs & CMCs



- Intra-RMO CMC reviews (1)

Intra-RMO CMC reviews (1)				
NMI	CMC identifier	Quantity	Range	CMC status
NPLI	APMP-M-IN-00000FYL-2	Kinematic viscosity Newtonian liquids	100 mm ² /s to 10000 mm ² /s	RMO: Under Review
NPLI	APMP-M-IN-00000FYK-2	Kinematic viscosity Newtonian liquids	10 mm ² /s to 100 mm ² /s	RMO: Under Review
NPLI	APMP-M-IN-00000FYJ-2	Kinematic viscosity Newtonian liquids	1 mm ² /s to 10 mm ² /s	RMO: Under Review
NPLI	APMP-M-IN-00000FYI-2	Kinematic viscosity Newtonian liquids	0.1 mm ² /s to 10 mm ² /s	RMO: Under Review
NPLI	APMP-M-IN-00000FYH-2	Kinematic viscosity Newtonian liquids	0.01 mm ² /s to 0.1 mm ² /s	RMO: Under Review
NPLI	APMP-M-IN-00000FYG-2	Kinematic viscosity Newtonian liquids	0.001 mm ² /s to 0.01 mm ² /s	RMO: Under Review
NPLI	APMP-M-IN-00000FXU-2	Mass	0.001 g to 0.2 g	RMO: Under Review

CIPM MRA: KCs & CMCs



- Intra-RMO CMC reviews (2)

Intra-RMO CMC reviews (2)				
NMI	CMC identifier	Quantity	Range	CMC status
NPLI	APMP-M-IN-00000QH8-1	Mass	0.5 g to 1.0 g	RMO: Under Review
NPLI	APMP-M-IN-00000FXV-2	Mass	2 g	RMO: Under Review
NPLI	APMP-M-IN-00000FXW-2	Mass	5 g	RMO: Under Review
NPLI	APMP-M-IN-00000FXX-2	Mass	10 g	RMO: Under Review
NPLI	APMP-M-IN-00000FXY-2	Mass	20 g	RMO: Under Review
NPLI	APMP-M-IN-00000FXZ-2	Mass	50 g	RMO: Under Review
NPLI	APMP-M-IN-00000FY0-2	Mass	100 g	RMO: Under Review

CIPM MRA: KCs & CMCs



- Intra-RMO CMC reviews (3)

Intra-RMO CMC reviews (3)				
NMI	CMC identifier	Quantity	Range	CMC status
NPLI	APMP-M-IN-00000FY1-3	Mass	200 g	RMO: Under Review
NPLI	APMP-M-IN-00000FY2-3	Mass	500 g	RMO: Under Review
NPLI	APMP-M-IN-00000FXT-3	Mass	1 kg	RMO: Under Review
NPLI	APMP-M-IN-00000FY3-2	Mass	2 kg	RMO: Under Review
NPLI	APMP-M-IN-00000FY4-2	Mass	5 kg	RMO: Under Review
NPLI	APMP-M-IN-00000FY5-2	Mass	10 kg	RMO: Under Review
NPLI	APMP-M-IN-00000FY6-2	Mass	20 kg	RMO: Under Review

CIPM MRA: KCs & CMCs



- Intra-RMO CMC reviews (4)

Intra-RMO CMC reviews (4)				
NMI	CMC identifier	Quantity	Range	CMC status
NPLI	APMP-M-IN-00000FY7-2	Mass	50 kg	RMO: Under Review
NPLI	APMP-M-IN-00000FY8-2	Mass	100 kg to 2000 kg	RMO: Under Review
NPLI	APMP-M-IN-00000FY9-6	Density of solid Solid density artefact	1000 kg/m ³ to 22000 kg/m ³	RMO: Under Review
NPLI	APMP-M-IN-00000FYA-4	Density of liquid Density measuring device	600 kg/m ³ to 2000 kg/m ³	RMO: Under Review
SNSU-BSN	APMP-M-ID-00000QMO-1	Force: compression, tension	2 kN to 1000 kN	RMO: Revision Requested
SNSU-BSN	APMP-M-ID-00000QMP-1	Torque: clockwise, anti-clockwise	5 N m to 100 N m	RMO: Revision Requested
SNSU-BSN	APMP-M-ID-00000QMQ-1	Torque: clockwise, anti-clockwise	100 N m to 2000 N m	RMO: Revision Requested

CIPM MRA: KCs & CMCs



- Intra-RMO CMC reviews (5)

Intra-RMO CMC reviews (5)				
NMI	CMC identifier	Quantity	Range	CMC status
NPLI	APMP-M-IN-00000FXD-2	Gauge pressure: gas medium	0.036 MPa to 4.0 MPa	RMO: Under Review
NPLI	APMP-M-IN-00000FXF-2	Gauge pressure: gas medium	8 MPa to 12 MPa	RMO: Under Review
NPLI	APMP-M-IN-00000FXG-2	Gauge pressure: gas medium	12 MPa to 20 MPa	RMO: Under Review
NPLI	APMP-M-IN-00000FXH-2	Gauge pressure: gas medium	20 MPa to 40 MPa	RMO: Under Review
NPLI	APMP-M-IN-00000QO2-1	Gauge pressure: gas medium	0.1 MPa to 1.0 MPa	RMO: Under Review
NPLI	APMP-M-IN-00000QO3-1	Gauge pressure: gas medium	40 MPa to 100 MPa	RMO: Under Review
NPLI	APMP-M-IN-00000FXE-3	Gauge pressure: gas medium	4 MPa to 8 MPa	RMO: Under Review

CIPM MRA: KCs & CMCs



- Intra-RMO CMC reviews (6)

Intra-RMO CMC reviews (6)				
NMI	CMC identifier	Quantity	Range	CMC status
NPLI	APMP-M-IN-00000FXI-2	Differential pressure: gas medium	30 kPa to 150 kPa	RMO: Under Review
NPLI	APMP-M-IN-00000FXJ-2	Gauge pressure: liquid medium	500 MPa to 1000 MPa	RMO: Under Review
NPLI	APMP-M-IN-00000FXK-2	Gauge pressure: liquid medium	200 MPa to 500 MPa	RMO: Under Review
NPLI	APMP-M-IN-00000FXL-2	Gauge pressure: liquid medium	100 MPa to 200 MPa	RMO: Under Review
NPLI	APMP-M-IN-00000FXM-2	Gauge pressure: liquid medium	50 MPa to 100 MPa	RMO: Under Review
NPLI	APMP-M-IN-00000FXN-2	Gauge pressure: liquid medium	0.1 MPa to 50 MPa	RMO: Under Review
NPLI	APMP-M-IN-00000FX9-2	Absolute pressure: gas medium	0.001 kPa to 130 kPa	RMO: Under Review

CIPM MRA: KCs & CMCs



- Intra-RMO CMC reviews (7)

Intra-RMO CMC reviews (7)				
NMI	CMC identifier	Quantity	Range	CMC status
NPLI	APMP-M-IN-00000FXA-2	Gauge pressure: gas medium	0.001 kPa to 130 kPa	RMO: Under Review
NPLI	APMP-M-IN-00000FXB-2	Absolute pressure: gas medium	6.5 kPa to 360 kPa	RMO: Under Review
NPLI	APMP-M-IN-00000FXC-2	Gauge pressure: gas medium	20 kPa to 360 kPa	RMO: Under Review
NPLI	APMP-M-IN-00000FXO-2	Absolute pressure: gas medium, vacuum	0.05 MPa to 10 MPa	RMO: Under Review
NPLI	APMP-M-IN-00000FXP-2	Absolute pressure: gas medium, vacuum	3.0E-6 Pa to 0.1 Pa	RMO: Under Review
NPLI	APMP-M-IN-00000QO5-1	Absolute pressure: gas medium, vacuum	1.0E-8 mbar L/s to 1.0E-6 mbar L/s	RMO: Turned down
NPLI	APMP-M-IN-00000QO6-1	Absolute pressure: gas medium, vacuum	1.0E-9 mbar L/s to 1.0E-8 mbar L/s	RMO: Turned down

CIPM MRA: KCs & CMCs



- Inter-RMO CMC reviews (1)

Inter-RMO CMC reviews (JCRB reviews) (1)				
NMI	CMC identifier	Quantity	Range	CMC status
KRISS	APMP-M-KR-00000G1J-4	Force: Compression and tension	1 MN to 5 MN	JCRB: Revision Requested
SNSU-BSN	APMP-M-ID-00000LU4-2	Force: compression, tension	0.2 kN to 20 kN	JCRB: Under Review
SNSU-BSN	APMP-M-ID-00000QMN-1	Force: compression, tension	0.04 kN to 1 kN	JCRB: Under Review
NPLI	APMP-M-IN-00000FYE-2	Force: compression, tension	100 kN to 1000 kN	JCRB: Under Review
NPLI	APMP-M-IN-00000FYP-2	Force: compression, tension	1 kN to 100 kN	JCRB: Under Review
NPLI	APMP-M-IN-00000FYQ-2	Force: compression, tension	10 kN to 1000 kN	JCRB: Under Review
NPLI	APMP-M-IN-00000FYM-2	Force: compression, tension	10 N to 1000 N	JCRB: Under Review

CIPM MRA: KCs & CMCs



- Inter-RMO CMC reviews (2)

Inter-RMO CMC reviews (JCRB reviews) (2)				
NMI	CMC identifier	Quantity	Range	CMC status
NPLI	APMP-M-IN-00000FYN-2	Force: compression, tension	250 N to 5000 N	JCRB: Under Review
NPLI	APMP-M-IN-00000FYO-2	Force: compression, tension	500 N to 50000 N	JCRB: Under Review
NPLI	APMP-M-IN-00000FXQ-2	Hardness	20 HRA to 88 HRA	JCRB: Under Review
NPLI	APMP-M-IN-00000FXR-2	Hardness	20 HRB to 60 HRB	JCRB: Under Review
NPLI	APMP-M-IN-00000FXS-2	Hardness	60 HRB to 100 HRB	JCRB: Under Review
NPLI	APMP-M-IN-00000QHE-1	Hardness	20 HRC to 65 HRC	JCRB: Under Review
NPLI	APMP-M-IN-00000QHF-1	Hardness	50 HR30N to 80 HR30N	JCRB: Under Review

CIPM MRA: KCs & CMCs



- Inter-RMO CMC reviews (3)

Inter-RMO CMC reviews (JCRB reviews) (3)				
NMI	CMC identifier	Quantity	Range	CMC status
NML-BSTI	APMP-M-BD-00000PZ5-1	Mass	1 mg to 100 mg	JCRB: Under Review
NML-BSTI	APMP-M-BD-00000PZ6-1	Mass	0.1 g to 1.0 g	JCRB: Under Review
NML-BSTI	APMP-M-BD-00000PZ7-1	Mass	1 g to 100 g	JCRB: Under Review
NML-BSTI	APMP-M-BD-00000PZ8-1	Mass	0.1 kg to 1.0 kg	JCRB: Under Review
NML-BSTI	APMP-M-BD-00000PZ9-1	Mass	1 kg to 10 kg	JCRB: Under Review
SNSU-BSN	APMP-M-ID-00000PVO-1	Gauge pressure, gas medium	0.7 MPa to 7.0 MPa	JCRB: Under Review
NPLI	APMP-M-IN-00000FYF-2	Torque: clockwise, anti clockwise	2 N m to 2000 N m	JCRB: Under Review

Digitalization



A few NMIs have started to issue the Digital Calibration Certificates (DCCs) to domestic customers.



Other activities



- Mr. Shih Mean Lee, A-Star, Singapore, proposed a 50 kg mass comparison for which the protocol has been prepared and circulated for potential participants.
- Dr. Hiroaki Kajikawa, NMIJ, Japan, and Dr. In-Mook Choi, KRISS, Republic of Korea, will pilot the APMP link key comparisons for CCM.P-K16, -K17, and -K18 after they are completed.
- Dr. Jeerasak Pitakarnnop, NIMT, Thailand, conducted the workshop for the dynamic pressure measurement during the GA activities 2024.
- Dr. Koji Ogushi, TCM chair, tried to establish Working Groups of Mass & Density and Pressure & Vacuum in cooperation with members.

Thank you.

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