

GULFMET Technical Committee for Mass and Related Quantities

Report to CCM 25-26 May 2023 GULFMET TC-Mass Chair: Sami Bin Jurbua

CCM Meeting 25-26 MAY 2023

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Members: 7 NMIs

Bahrain

- Saudi Arabia (Member State)
- Kuwait (Associate Member State)
- Oman (Associate Member State)
- Qatar (Associate Member State)
- Yemen
- United Arab Emirates (Member State)
- Associates: 6 NMIs

NIS, KRISS, TUBITAK UME, SCL (HONG KONG), IMBIH BOSNIA, SE UZBEKISTAN.

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Overview

TC-Mass is responsible for carrying out the activities required by GULFMET for the fulfillment of the CIPM-MRA Specifically:

• The provision of technical support and facilitation of the intra- RMO CMC review process

• The participation in the inter-RMO review of CMC's

• The organization and technical support of GULFMET Key and Supplementary Comparisons Currently covers the areas of: Mass, Pressure, Force, Hardness, Torque, Gravity, Density, Viscosity and Volume.

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Meetings

TC-Mass meetings were held twice in 2022:

- 18th Meeting, Virtual Meeting, Sunday 13 June 2022.
- 19th Meeting, Virtual Meeting, Monday 21 Nov. 2022.





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Intra-RMO CMC reviews of GULFMET TC Mass

CMCs

18 CMC submissions from 2 countries - of these CMCs 14 are published, and 4 are currently in JCRB review:

- SASO-NMCC 14 CMCs in total: (Mass 7 CMCs, Pressure 2 CMCs, Force 4 CMCs and Gravity 1 CMCs).
- EMI 4 CMCs in total: Mass 4 CMCs currently in JCRB review.

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There was one training programs held in 2022, "Peer reviewers within the

<u>CIPM MRA</u>" evaluate and uncertainty for 17 person in GULFMET members

The course is designed to equip GULFMET peer reviewers with appropriate information on the key aspects relevant to review of quality management systems and CMCs within the CIPM MRA.

Training



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Peer review Projects

On site peer review :6th-7th Dec. 2022 in Kuwait PAI

Scope: Mass Standard

1mg — 20 kg (F1 class)

By Dr. Christos Mitsas / Mrs Asma ALHOSANI EMI (UAE)

On site peer review: SASO-NMCC (Planned)

Scope: Hardness filed.

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Approved Comparisons

- **GULFMET.M.M-S1**: Multiples and submultiples of the kg (10 kg, 500 g, 20 g, 2 g, 100 mg)
- UME (Turkey)-pilot, BDSM (Bahrain), PAI (Kuwait), *QAF (Qatar), SASO-NMCC (Saudi Arabia), QCC-EMI (UAE)

•<u>GULFMET.M.M-S2</u>: Multiples and submultiples of the kg (5 mg, 2 g, 50 g, 1 kg and 5 kg)

• UME (Turkey)-pilot, SASO-NMCC (Saudi Arabia)

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Approved Comparisons

• <u>GULFMET M.P-S1</u>: Comparison in the range of 0.7 MPa to 7 MPa of Gas Pressure

• UME (Turkey)-pilot, SASO-NMCC (Saudi Arabia), QCC-EMI (UAE)

• **<u>GULFMET M.M.-K7</u>**: Comparison of multiples and submultiples of the kilogram (5 kg, 100 g, 10 g, 5 g, 500 mg)

• UME (Turkey)-pilot, INRIM (Italy), METAS (Switzerland), PAI (Kuwait), QGOSM (Qatar), SASO-NMCC (Saudi Arabia), QCC-EMI (UAE)

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Approved Comparisons

- <u>GULFMET M.P-S1</u>: Comparison in the range of 0.7 MPa to 7 MPa of Gas Pressure
- UME (Turkey)-pilot, SASO-NMCC (Saudi Arabia), QCC-EMI (UAE)

•<u>GULFMET M.F.-S1</u>: Force measurements in the range 100 kN to 1 MN • UME (Turkey)-pilot, SASO-NMCC (Saudi Arabia), QCC-EMI (UAE)

•GULFMET M.F.-S2: Force measurements in the range 0.4 kN to 100 kN

• UME (Turkey)-pilot, SASO-NMCC (Saudi Arabia)

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On-going• GULFMET.M.D-S1:
Comparison in solid density (stainless steel weights
1 kg, 200 g, 20 g, 2 g)• Pilot: QCC-EMI (UAE) , SASO-NMCC (Saudi Arabia), UME (Turkey) NIS

(Egypt)



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- <u>GULFMET.M.FF-S1</u>: Calibration of piston operated micro-pipette
- Pilot: QCC-EMI (UAE)
- UME (Turkey), SASO-NMCC (Saudi Arabia), IMBH (Bosnia & Herz.)
- <u>GULFMET.M.T-S1</u> (CCM-T-K3) Comparison of torque standards 5 N·m, 10 N·m, 20 N·m& 50 N·m
- Pilot: UME (Turkey) SASO-NMCC (Saudi Arabia), QCC-EMI (UAE)

Planned Comparisons

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• <u>GULFMET.M.T-S2</u> (CCM-T-K1) Comparison of torque standards 500 N·m, 1000 N·m,

Planned • Pilot: UME (Turkey)

Comparisons • SASO-NMCC (Saudi Arabia), QCC-EMI (UAE).

• <u>GULFMET M.F.-S2</u> (CCM-F.K4 2MN,4MN) Force measurements in the range 2000 kN to 3000 kN

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- **<u>GULFMET.M.H-S1</u>** Comparison of Vicker Hardness blocks Scales
- Pilot: UME (Turkey)

Planned Comparisons

• SASO-NMCC, INRIM, KRISS

- **<u>GULFMET M.H.-SO2</u>** Comparison of Brinell Hardness blocks Scales
- Pilot: UME (Turkey)
- SASO-NMCC, PTB, KRISS

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GULFMET R&D Project

Development of transfer Standards for Traceability of Hardness Diamond Indenter Calibration Systems

- Start date :01 March 2022
- Duration : 18 Months
- Coordinators :

Chief Researcher Cihan KUZU (UME) GULFMET Secretary Omar KANAKRIEH

- Kick-off meeting was made
- It is ongoing
- Literature research was completed
- 2 Technical meetings and 2 Workshop were completed
- Design of the transfer standards are started.

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Participants:

Scientific Research GULFMET R&D Project

Cihan Kuzu (UME) Sami Bin Jurbua (SASO-NMCC) Faisal AlQahtany (SASO-NMCC) Farah Aljamaan (SASO-NMCC) Mohammed A. AlAydan (SASO-NMCC) Ercan Pelit (UME) Ilker Meral (UME) Muharrem Asar (UME) Al-Anoud H. Al-Rai (KWI) Kaled alshi (EMI) Abdulelah al grnas (GULFMET) Abdullh alkdhori (Oman)

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- Objective

Rockwell indenters;

*radius of sphero-conical diamond indenters, * cone angle,

*tilt angle,

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R&D Project

*generatrics straightness of the indenter cone,

* deviation from the mean radius of diamond tip.

Vickers indenters;

*roof angle of the square-based pyramid diamond indenters,

* tilt angle of diamond,

- * squareness of the indenter four faces,
- * flatness of the pyramid faces,

* length of the line of junction of the indenters at the roof. For more details in this project :

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فباسات موثوقة

UME

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سات موتوقه



SASO-NMCC & TUBITAK- UME participate in IMEKO International Conference TC5 11 – 13

October 2022, Cavtat - Dubrovnik, Croatia with 2 Papers:

1 - <u>1kN·m UNIVERSAL TORQUE CALIBRATION MACHINE</u> WITH REFERENCE TORQUE TRANSDUCER AT SASO/NMCC.

2 - 50 N·m TORQUE STANDARD MACHINEATSASO/NMCC.



1 kN·m UNIVERSAL TORQUE CALIBRATION MACHINE WITH REFERENCE TORQUE TRANSDUCER AT SASO/NMCC

Research Projects

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SASO-NMCC (Saudi Arabia) – NIS (Egypt) participate in CIM 2023 21 International Metrology Congress 07 March 2023, Lyon, France with 1 poster :

Research Projects -



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SASO-NMCC (Saudi Arabia) participate in JAVERIANA 2022, in Force Filed:

Difference between calibration and practical force proving instruments

Research

Projects

SASO-NMCC (Saudi Arabia) participate in ACFMET2022 2022, in Gravity Filed: A Method for Absolute Gravity Measurement at SASO/NMCC Using the FG5X Gravimeter

SASO-NMCC (Saudi Arabia) participate in 14th International Conference MEASUREMENT 2023, in Volume Filed:

Accurate gravimetric calibration of micro-pipettes using double evaporation trap with temperature correction and new uncertainty budget

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SASO-NMCC (Saudi Arabia) participate in EURAMET M.M-K7, in Mass Filed: (5 kg - 100g - 10g - 5g - 500mg) SASO-NMCC (Saudi Arabia) participate in EURAMET M.M-S11, in Mass Filed: 20 kg SASO-NMCC (Saudi Arabia) participate in CCM.D-K5, in Density Filed: DENISTY OF LIQUED (Dodecane - FC-40 - viscosity oil) SASO-NMCC (Saudi Arabia) participate in CCM.G-K2. Vienna2023, in Gravty Filed: It will be at September in USA SASO-NMCC (Saudi Arabia) participate in EURAMET M.FF-S16, in Volume Filed. SASO-NMCC (Saudi Arabia) participate in APMP M.FF.K4, in Volume Filed. 100 ml - 20 LSASO-NMCC (Saudi Arabia) participate in CCM.V-K4, in Viscosity Filed. Viscosity of liquid (Liquid A @ 20,40,100 C) (Liquid B @ 10,20,100 C) SASO-NMCC (Saudi Arabia) participate in CCM.D-K1.2023, in Density Filed. 1kg

Other Comparisons

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Acknowledgments

Thanks to our Associate Members for supporting GULFMET activities and piloting GULFMET comparisons

Thanks for all NMIs and Pilot Comparison for support GULFMET to increase Metrology in our RMO.





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