الهيئة السعودية للمواصفات والمقاييس والجودة
Saudi Standards, Metrology and Quality Org.

Saudi Standards, Metrology and Quality Org.

General Information about Saudi Arabia

Real picture

Real picture

Population

SAUDI	FOREIGNERS
Around 20 Million	Around 10 Million

Economy

Petrol industrial
Petrochemical industrial

Saudi Arabia NMI

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National Measurement and Calibration Center (NMCC)

- (NMCC) was established in 1406 AH (1986 AD). it is the first reference for measurement and Calibration in the kingdom , The Center is responsible for maintaining and keeping:

National / reference / secondary and working standards, and enhancing their accuracy whenever required.

- Calibrating the measurement instruments and standards by the highest level of accuracy for governmental and private agencies as well as GCC member states.

- We shifted to new building in the middle of 2013.

National Measurement and Calibration Center (NMCC)

Departments of NMCC

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- Mass and related Qua.
  - Mass
  - Pressure
  - Force
  - Torque
  - Hardness
  - Gravity
  - Volume
  - Density
  - Viscosity
- Temperature
  - Humidity
  - Radiation
  - Contact
- Time and frequency
  - Time and frequency
  - Microwave
  - Vibration
  - Acoustic
- Chemical
  - Organic
  - Electrochemistry
  - Gas
- Length
  - Dimensional
  - Wavelength
- Electrical
  - Voltage
  - Impedance
  - Power and Energy
  - Magnetic Field
- Optics
  - Radiometric
  - Photometric

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Staff of NMCC

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Department	Doctor	Master	Bachelor
Mass and related Qua.	1	-	11
Temperature	1	-	4
Time and frequency	-	1	5
Chemical	-	-	5
Length	-	-	5
Electrical	-	-	7
Optics	-	1	3
Management	-	-	6
Total	50		

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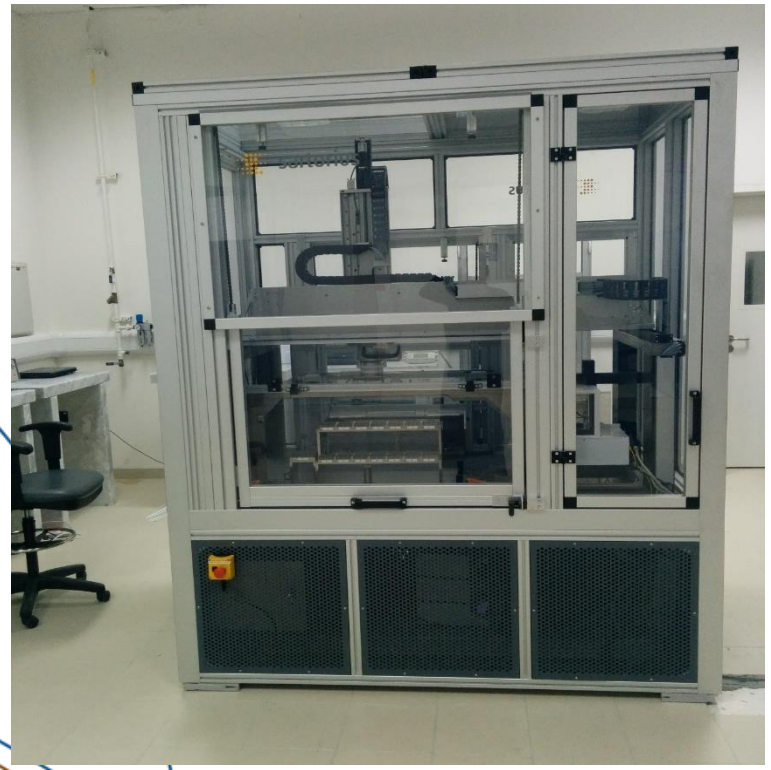
SASO had singed a developing and training project with UME (Turkey metrology institute) this project will increase our knowledge and experience and most important is NMCC CMC (Calibration Measurements Capabilities)



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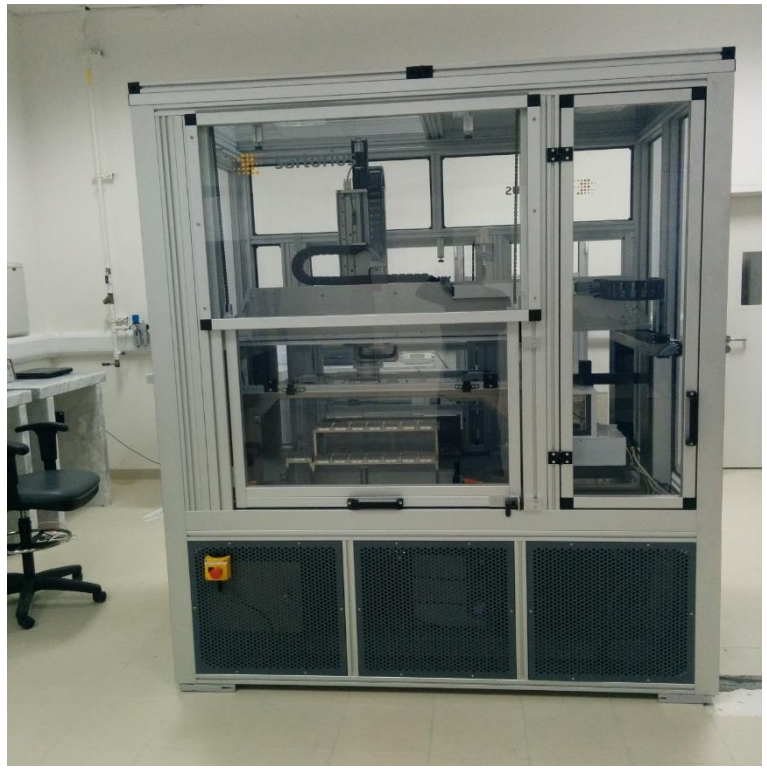
Mass laboratory

Instrument or Artifact	Minimum value	Maximum value	Units	Value	Units	Source of traceability
Mass standards	1	100	mg	0.6 to 1	µg	UME
Mass standards	0.1	1	g	1 to 2	µg	UME
Mass standards	1	10	g	2 to 4	µg	UME
Mass standards	10	100	g	4 to 10	µg	UME
Mass standards	0.1	1	kg	0.01 to 0.1	mg	UME
Mass standards	1	10	kg	0.1 to 1	mg	UME
Mass standards	10	50	kg	1 to 5	mg	UME



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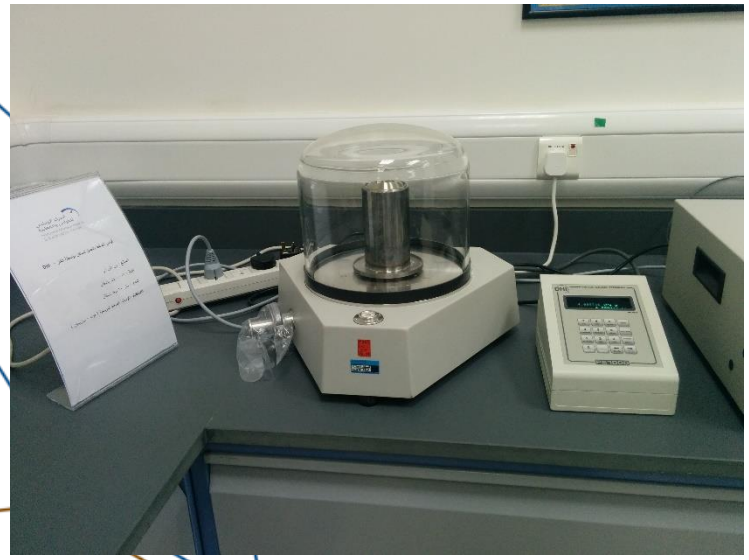
Pressure laboratory

Instrument or Artifact	Minimum value	Maximum value	Units	Value	Units	Source of traceability
Pressure balance	0.06 E+06	10.0E+06	Pa	(307 Pa +2.20E-5 p) p pressure in Pa	%	UME
Pressure balance	0.41 E+06	100.0E+06	Pa	(2170 Pa +2.77E-5 p) p pressure in Pa	%	UME



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Force laboratory

Instrument or Artifact	Minimum value	Maximum value	Units	Value	Units	Source of traceability
Force Measuring Device	0.1	1000	kN	0.266	%	UME

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Electrical laboratory

Instrument or Artifact	Minimum value	Maximum value	Units	Value	Units	Source of traceability
DC Standard	1.018	10	V	0.4	µV/V	UME
Reference Multimeter	200	1000	mV-V	0.8-1.6	µV/V	UME
Reference Multimeter	200	20	µA-A	14-35	µA/A	UME
Reference Multimeter	200	1000	mV-V	18-400	µV/V	UME
Reference Multimeter	200	20	µA-A	0.065-0.55	mA/A	UME
Reference Multimeter	2	2	Ω- GΩ	5 - 70	µΩ/Ω	UME

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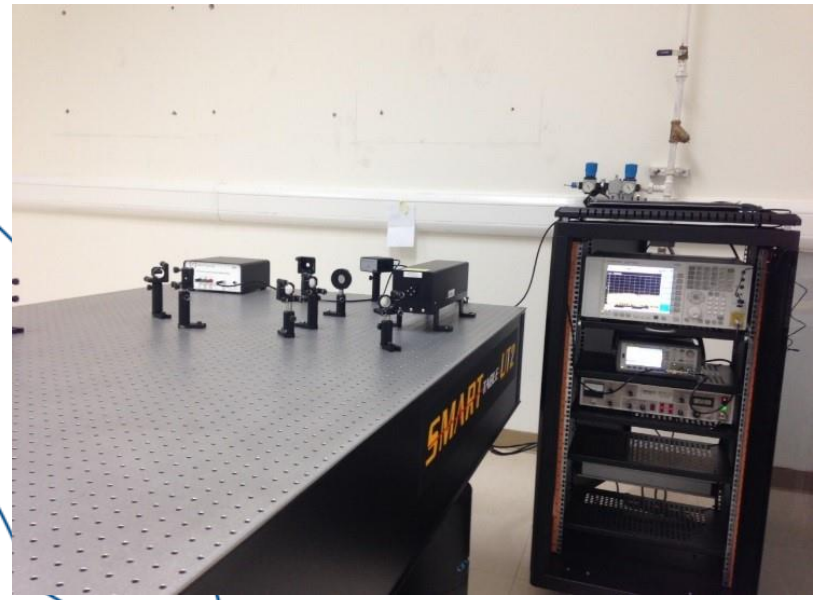
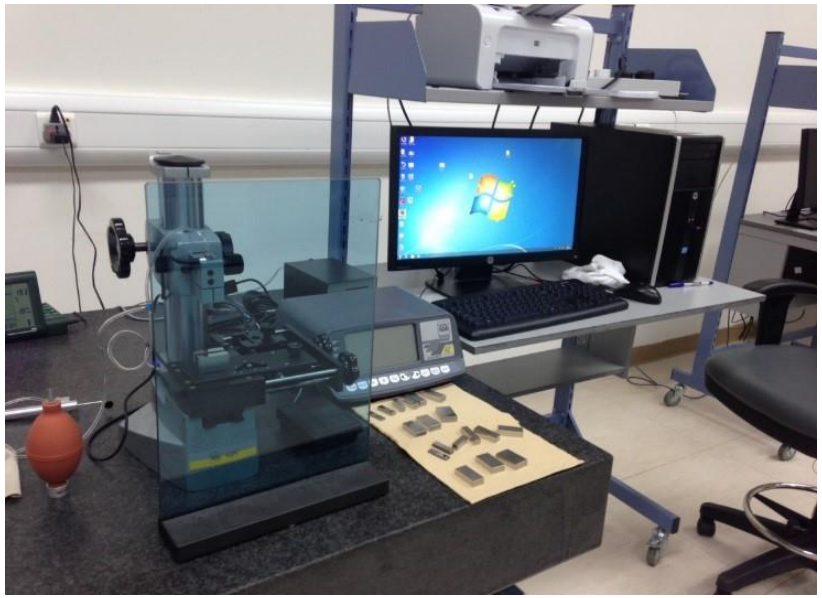
Wavelength laboratory

Instrument or Artifact	Minimum value	Maximum value	Units	Value	Units	Source of traceability
Iodine Stabilized He-Ne laser	633	633	nm	0.013	MHz	UME





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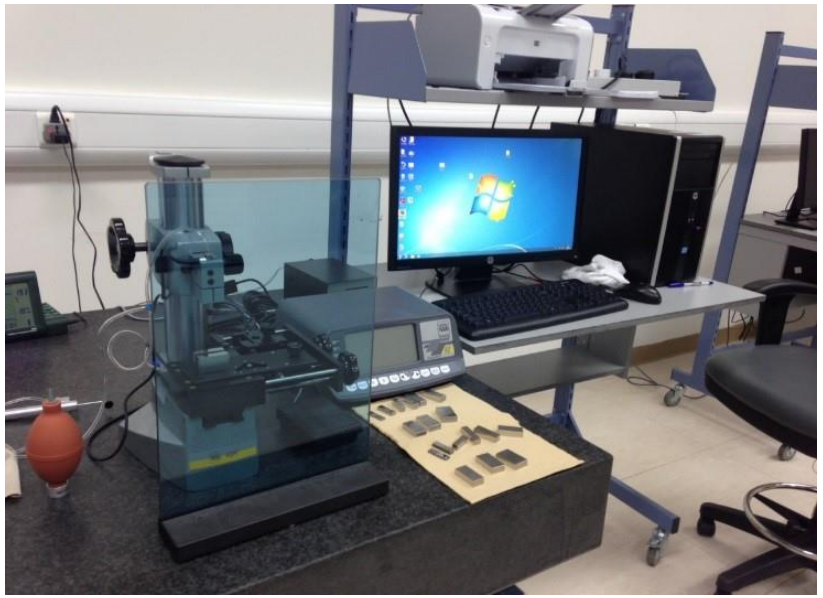
Dimension laboratory

Instrument or Artifact	Minimum value	Maximum value	Units	Value	Units	Source of traceability
Gauge Block Set	0.5	100	mm	Q[25;0.4L] L in mm	nm	UME
Long Gauge Block Set	131.4	243.5	mm	Q[56;0.4L] L in mm	nm	UME
Gauge Block set	2.5	25	mm	Q[25;0.4L] L in mm	nm	UME
Gauge Block set	0.05	4	inch	Q[1;0.4L] L in inch	µinch	UME



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Temperature laboratory

Instrument or Artifact	Minimum value	Maximum value	Units	Value	Units	Source of traceability
Sensors with display unit	0	40	ºC	0.002 to 0.003	ºC	FLUKE - USA
Sensors with display unit	40	80	ºC	0.002 to 0.003	ºC	FLUKE - USA
Sensors with display unit	80	300	ºC	0.002 to 0.003	ºC	FLUKE - USA
Sensors with display unit	300	550	ºC	0.002 to 0.003	ºC	FLUKE - USA
Liquid-in-glass thermometers	0	40	ºC	0.002 to 0.003	ºC	FLUKE - USA
Liquid-in-glass thermometers	40	80	ºC	0.002 to 0.003	ºC	FLUKE - USA
Liquid-in-glass thermometers	80	300	ºC	0.002 to 0.003	ºC	FLUKE - USA

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Temperature laboratory

Instrument or Artifact	Minimum value	Maximum value	Units	Value	Units	Source of traceability
Base metal thermocouple	226.4	415.6	ºC	0.5	ºC	UME - TR
Base metal thermocouple	658	1093.7	ºC	0.7	ºC	UME - TR
Long-stem SPRT	0.01	0.02	ºC	0.10	mK	UME - TR
Long-stem SPRT	-38.8344	-38.8345	ºC		mK	FLUKE - USA
Long-stem SPRT	29.7646	29.7647	ºC	0.002	mK	FLUKE - USA
Long-stem SPRT	156.5985	156.5986	ºC	0.003	mK	FLUKE - USA
Long-stem SPRT	231.928	231.929	ºC	0.003	mK	FLUKE - USA
Long-stem SPRT	419.527	419.528	ºC	0.006	mK	FLUKE - USA
Long-stem SPRT	660.323	660.324	ºC	0.006	mK	FLUKE - USA

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Time & Frequency laboratory

Instrument or Artifact	Minimum value	Maximum value	Units	Value	Units	Source of traceability
Frequency Generation and Measurement	0-1		S	50 ns	S	UME
Frequency Generation and Measurement	1Hz	DC – 50 GHz	Hz	DC – 2 GHz (1 x 10-11 x f(Hz)) 2 GHz – 50 GHz (1 Hz)	Hz	UME
Time Measurement	1		S		S	UME
Time Interval Measurement	0.5 ns	1010 s	S		S	UME
Amplitude Measurement Range	-100 dBm	+20 dBm	dBm		dBm	
Amplitude Measurement Range	-100 dBm	+20 dBm	dBm		dBm	UME
Modulation Parameter Measurement	-AM (%0 to %100), – FM (1 kHz to 400 kHz), – PM (0.1 rad to 10 rad)		Hz		Hz	UME
Phase Noise Measurement	• Carrier Frequency Range : 100 kHz - • Offset Range : 1 Hz - 100 MHz • Noise Floor : < -165 dBc/Hz	26.5 GHz	Hz		Hz	UME

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Tow laboratory are under establishments we hope they start within this year

- Chemical laboratories
- Optics laboratories

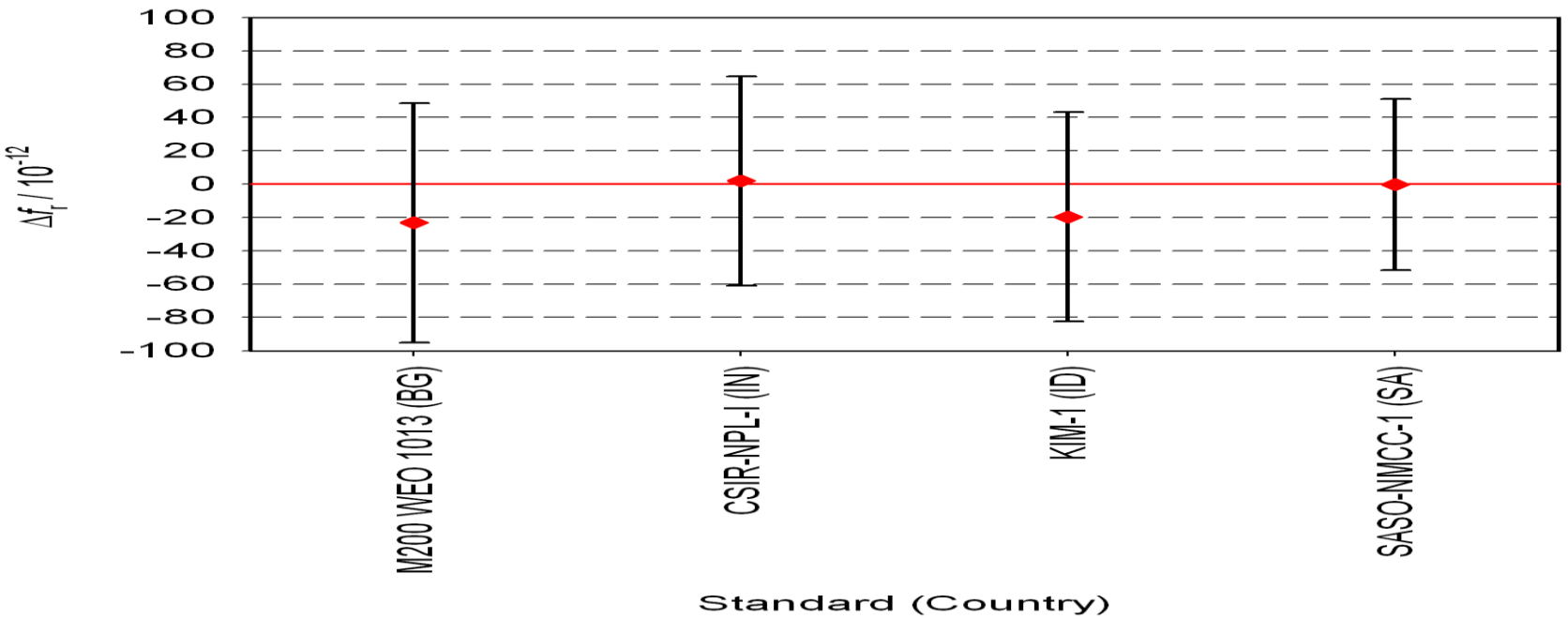
Comparison Participate

To prove your CMC any NMI should participate in all fields that he want to be Recognize on the BIPM and other NMIs
NMCC just started to participate in some comparison

Department	Instrument	RMO	Pilot
Mass	500mg,2g,20g,500g,10kg (E1)	GULFMET	UME
Pressure	Pressure Gauge (100 Mpa)	EURAMET	UME
Length	He – Ne / I_2 Laser 633 nm	-	BEV*

* We received a draft A report of inter-comparison

Figure 1. Relative degree of equivalence for the standards. Error bars represent the relative expanded (for k=2) uncertainties $U_r(i)$.



Laboratory (country code)	$U_e = 2u_e$	U_{CMC}
BIM (BG)	$72 \cdot 10^{-12}$	$51 \cdot 10^{-12}$
NPLI (IN)	$42 \cdot 10^{-12}$	$42 \cdot 10^{-12}$
KIM-LIPI (ID)	$42 \cdot 10^{-12}$	—
SASO (SA)	$51 \cdot 10^{-12}$	—

Calibration certificates

One of main task that NMCC responsible to customer is issuing calibration certificate

Department	Yearly
Mass and related Qua.	350
Temperature	60
Time and frequency	5
Length	70
Electrical	35

Conclusion :

I would like to talk deeply for Length Department for development with Tubitak UME, It will complete at the end of 2016 such as :

- Short & Long GB Interferometer.
- Angle measurement : sine bar, angle block, index table, autocollimator..

Finally :

I am glad to present my presentation in 16th of CCL meeting.

Thank you for your kind attention

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