

Ministry of Higher Education and
Scientific Research

National Institute of Standards
NIS



2017

Division of Mass & Force Metrology

Includes 5 Laboratories:

- Mass, Density & Pressure Laboratory
- Volume and Fluid flow Laboratory
- Acoustics Laboratory
- Force & Material Metrology Laboratory
- Ultrasonic Laboratory

Mass, Density & Pressure Laboratory

The mass laboratory investigates traceability to all equipment measuring masses using the national primary standard of mass for the Arab Republic of Egypt. The kilogram copy No.58, manufactured from Platinum-Iridium Alloy. This kilogram used for transfer the traceability to the other masses inside and outside the republic. Lab adopts the policy of establishing the traceability of its standards tracing to its own primary standards and avoid the external calibrations.

Mass Lab.

Masses Calibration of different classes from E_1 up to M_3 in the range from 1 mg to 1000 kg. Calibration of the balances, micro balance, truck Weighing scale, asphalt and concrete patch plants up to 200 ton.

Density Lab.

The density laboratory maintains the primary standard of solid and liquid density (1 kg Single Crystal Silicon Sphere). Measuring the density of masses using a set of systems in the range from 1g up to 50 kg. Automatic calibration of the density hydrometers in the range from 500 kg/m³ up to 3000 kg/m³ using the Automated Hydrostatic Weighing System also calibration of the digital densitometers

Pressures Lab.

The laboratory verifies the National Primary Standard of pressure unit and transfer the traceability to other pressure equipments. Pressure lab maintains the force balance piston gauge FPG for Gauge, Differential and Absolute in ranges up to 15 kPa. Gas Pressure balance with set of piston cylinder for absolute and gauge pressure up to 40 MPa. Oil pressure balance with set of piston cylinder for gauge pressure up to 500 MPa.



Volume and Fluid flow Laboratory (VFL)

Volume Laboratory

The Laboratory calibrates all kind of Glassware, Automatic pipette, Prover tanks, Giant storage tanks and make direct metrology traceability to the National Standard Platinum kilogram with the best accuracy and low possible uncertainty in Egypt.

Fluid Flow Laboratory

The Laboratory develops primary standard systems for liquid and gas flow measurements and doing computer simulation for fluid flow. In addition to giving calibration services to different kind of liquid and gas flow meters and make the metrology traceability to SI units.



Acoustics Laboratory

Activities of the Acoustic department

Activities of the department are divided into three main groups:

1-Calibration of sound and vibration measuring devices

- Primary calibration of sound level meters
- Secondary calibration for sound calibrators
- Primary & secondary calibration for microphones
- Calibration of loud speakers
- Calibration of accelerometers

- Calibration of audiometer
- Telephone test
- Calibration of reference sound source

2- Acoustic measurements in building and vibrations

- Measurement of acoustic absorption coefficient and reflection coefficient for the materials and also the acoustic impedance
- Measurement of the acoustic insulation of the materials.



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- Measurement of the sound distribution in auditorium
- Measurement of the acoustic power for machines
- Measurement of the vibrations
- Measurement of the different noise & its control

3-Hearing measurements

- Measurement of the hearing threshold for human
- Audiometer calibration system for hospitals and clinics

Also from the department activities

- Training courses in the sound and vibration measurements.
- Acoustics consultant for different activities.



Force & Material Metrology Laboratory

Force and Material Metrology laboratory offers traceable measurements for force, torque, hardness and Impact. The laboratory carries researches on material science, stress analysis, measurement instruments and calibration methods in order to serve the industry.

The laboratory participates in inter-laboratory comparisons organized under BIPM umbrella. The quality system in force primary activity achieve the international recognition in 2009 and its CMC's was published on BIPM-KCDB in 2009, torque CMC's was published in 2015.

The laboratory offers test facilities in parallel with calibration facilities. Tensile tests, and hardness tests activities were accredited by EGAC in 2011.



Ultrasonic Laboratory

Ultrasonic Department Mission

- The ultrasound metrology lab is designated the responsibility to establish and maintain the Egyptian measurements in the field of ultrasonic and compare them continuously with the international standards, so that they would be always valid and ready for calibration purposes.
- Carrying out scientific researches and physical properties measurements of different materials.

Available services

1- The ultrasonic laboratory can perform the calibration services according to the international standards as follows:

- Calibration of ultrasonic instruments used for non-destructive testing of materials using pulse echo technique.
- Calibration of ultrasonic standard reference blocks.
- Calibration of different types of ultrasonic transducers (normal, angle and TR probes).
- Calibration of ultrasonic thickness gauges.
- Calibration of ultrasonic flow meters.
- Calibration of Ultrasonic cleaners.
- Calibration of AC Yokes.

2-Testing According to international standards (Detection & Evaluation)

3-Training and advisory

The most important measurements in the laboratory:

- Measurement of ultrasonic wave velocities (Longitudinal & transverse)
- Calculations of mechanical properties of materials which are compared with those obtained using different techniques.



Mass, Density and Pressure Laboratory

The lab maintains the national primary standard of mass for the Arab Republic of Egypt. The kilogram copy No.58, manufactured from Platinum-Iridium Alloy. This kilogram used for transfer the tractability to the other masses inside and outside the republic. Lab adopts the policy of establishing the traceability of its standards tracing to its own primary standards and avoid the external calibrations.

International Recognition

The primary standards of Mass, Density and Pressure Lab. are recognized from BIPM Based on the agreement of CIPM-MRA and the CMC's had been published via BIPM – KCDB.

International Comparisons

Since 1999 mass, density and pressures lab participating effectively in the comparisons organized within the activities of BIPM and regional metrology organizations like AFRIMETS, EURAMET, APMP and GULFMET. Lab participated in more than 30 key and supplementary comparisons in the laboratory activities.



- Automatic calibration of the density hydrometers in the range from 500 kg/m³ up to 3000 kg/m³ using the Automated Hydrostatic Weighing System also calibration of the digital densitometers



Calibration and measurement services

1- Mass Laboratory Calibration Service

- Calibration of the masses of different classes from E1 to M3 in the range from 1 mg to 1000 kg. Also Calibration of any other different masses.
- Measurement of magnetic susceptibility of the masses.
- Calibration of the balances and the weighing instruments from micro balance up to 200 ton.

The mass laboratory has many accurate comparators which used in the calibration serves and scientific researches, for example.

- Micro-comparator balance with capacity of 6 g and readability 0.1 µg.
- Comparator balance with capacity of 21 g and readability 1 µg.
- Automatic comparator balance with 4-position load alternator. Capacity 1000 g and readability 1 µg.
- Automatic comparator balance with automatic 4-position load alternator. Capacity 10 kg and readability 10 µg.
- Automatic comparator balance with capacity 50 kg and readability 1 mg with automatic 2-Position load alternator.
- 1 Ton comparator balance with capacity 1100 kg and readability 0.5 g.
- Susceptometer for measuring the susceptibility and magnetization of the masses up to 50 kg with readability 1 µg.



2- Density Laboratory Calibration Service

- The density laboratory maintains the primary standard of solid and liquid density (1 kg Single Crystal Silicon Sphere).

3- Pressure Laboratory Calibration Service

The laboratory acquires the National Primary Standard pressure through two identical set of piston cylinder assembly with diameter of 35 mm to verify the national unit of the pressure to other piston cylinder assembly up to 500 MPa.

- Pressure lab maintains the force balance piston gauge FPG for Gauge, Differential and Absolute in ranges up to 15 kPa.
- Gas Pressure balance with set of piston cylinder for absolute and gauge pressure up to 40 MPa.
- Oil pressure balance with set of piston cylinder for gauge pressure up to 500 MPa.
- Reference pressure instruments used in the secondary calibrations from 1 Pa up to 280 MPa.
- Testing of pressure relieves valves, pressure vessels and pipe lines according to international standards



Training and consultancy

- Lab operates set of 9 specialized training courses yearly in the field of mass, density and pressure metrology and uncertainty calculation.
- Send specialists of high degree of efficiency to transfer their experience in the above mentioned fields to various sectors which need this service.
- Offer consultancy concerned with the above mentioned fields.

Important Customers

- 1-Egyptian Organization for Standardization & Quality (EOS)
- 2-Assay and balances
- 3-General Organization for Export &Import Control
- 4-Organization for Industrialization
- 5-Pfizer
- 6-Petro jet
- 7-ENCO lab., El Kuwait
- 8-Sudanese Standards and Metrology Organization (SSMO)
- 9-Faculty of Pharmacy, King Saud University
- 10-Halliburton, Angola

Volume and Fluid Flow Metrology Laboratory

Volume Laboratory : We calibrate all kind of Glassware, Automatic pipette, Prover tanks ,Giant storage tanks and make direct traceability chain to the National Standard Platinum kilogram with the best accuracy and low possible uncertainty in Egypt.

Fluid Flow Laboratory : We develop primary standard systems for liquid and gas flow measurements and doing computer simulation for fluid flow. In addition to giving calibration services to different kind of liquid and gas flow meters and make the traceability chain to SI units.

Mission

Establish and preserve the primary and secondary standards systems to offer measurement results direct traceable to the SI units and transfer the traceability chain to domestic, regional and international sectors.

Vision

- Build primary standard systems
- Establish secondary standard laboratories
- Research the relevant topics to volume and fluid flow measurements
- Participating in the international activities related to volume and fluid flow measurements
- Offering calibration and proficiency tests to national and international agencies
- Sustainable development.

Volume Laboratory

Calibration of all kind of glassware range from 1 μ L up to 6 L as seen in the fig.



1- Micropipette calibration systems

The micropipette is used to transfer small amounts (< 1 ml) of liquids. The scales on micropipettes are in microliters. we are offering a high precise services with low uncertainty to calibrate the single and the multi-channel micropipettes up to 12 channels. As show in fig

2- Proving Tanks

Proving tanks (Provers) are bottom-drain volumetric measures with or without a graduated bottom-neck. are used to calibrate other volumetric vessel or liquid flow meters. As show in fig



Fluid Flow Laboratory

The fluid flow laboratory at National Institute of the standards provides calibration services for measuring liquid and gas flow. The Lab. develops primary standard systems and simulation models for improving the measurements of fluid flow and makes the traceability chain to SI unit.

The lab.has the capabilities to calibrate different types of flow meters. As show in the fig.

1- Gas flow meter calibration



2- Liquid flow meter calibration



The lab.Has the following flow facilities to calibrate different types of flow meters f.

Liquid Flow facility LFS1



3- Set of turbine meter

4- Gas flow Facility

Primary systems
Bell Prover



PVTt1



5- Secondary Standards

Critical sonic nozzle



Laminar flow elements



Customers

- 1- Egypt air
- 2- General Organization for Importing and Exporting Control
- 3- Medical Labs.
- 4- National Organization For Research & Control Of Biologicals

Acoustics Department

The main objective of NIS Acoustics Laboratories is the realization, calibration and research project to improve the standards for measurement quantities of sound pressure level in air and rectilinear acceleration. The integration and equivalence of realized national standards within the international metrology system is assured through participation in international comparisons. Traceability and measurement coherence for secondary level laboratories within the country are provided by means of a wide range of calibration, measurement and test services. The Acoustics Laboratories are the Electro acoustics, Audiometric and Vibration Laboratory.

Calibration of devices used in acoustical measurements at the primary and secondary levels, characterization of special acoustical rooms.

The International System of Units (SI) defines the derived quantity Pa as the derived unit of measurement to be used in the acoustical area. Also it is represented as sound pressure level as dB, where the reference level is 20 μ Pa.

In acoustic department:

- Calibration and testing of acoustics devices using primary and secondary systems.
- One of the other objectives is to generate research projects.

Calibration and measurement services

1- Calibration of Sound level meter (SLM) using primary calibration system type 3630

The new standard IEC 61672: Parts 1–3 Standard replace both old SLM old (ISO60651) Standard and divide the instruments into two performance classes only: class 1 and class 2, compared with the older classifications of Type 0 to Type 3.

FEATURES



2- Calibration of Microphone using Reciprocity Calibration Apparatus Type 5998



Primary calibration of laboratory standard microphones with the reciprocity technique is standardized in international standard, IEC publication 61094-2:2009.

3- Calibration system for (Microphones, pistonphones, accelerometers and actuators)



4- Calibration of audiometer

5- Calibration of vibration

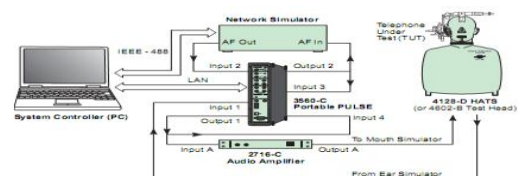
- calibration of devices used in vibration measurement
- Development and improvement of vibration lab.

- Comparison Technique with the aid of ISO 5347-3.
- The vibration source circuit consists of: vibration exciter body unit type B&K 4812, sine signal generator B&K 2035, and power amplifier type B&K 2707, was used to generate vibrations of sine wave with certain levels at different frequencies from 10 Hz to 1000 Hz in third-octave bands.



6- Telephone Test

- Measures the full transmit and receive signal path using a proper network simulator and air interface
- The HATS simulates a telephone user's ear and mouth, allowing the tested telephone's handset to be mounted in the correct position relative to the artificial ear and mouth simulator



7- Field Measurements :

- Sound distribution and reverberation time in auditoriums.
- Sound insulation in buildings and of building elements.
- Sound power of electric machinery.
- Environmental noise.
- Vibration parameters.

8- Consultant:

- Scientific consultation for controlling ambient noise levels
- Define criteria and recommended designs for the best acoustical performance.
- Suggestions to overcome acoustics problems in many fields such as :
 - Building and vibrations
 - Industry
 - Human health
 - Noise pollution

Customers

- 1- Egypt Air
- 2- Miraco Carrier
- 3- Eastern Company
- 4- Egyptian Environmental Affairs Agency
- 5- Arsenal of Port Said
- 6- Faculty of Engineering, Cairo University

Force and Material Metrology laboratory

offers traceable measurements for force, torque, hardness and Impact. The laboratory carries researches on material science, stress analysis, measurement instruments and calibration methods in order to serve the industry.

Tasks

The laboratory own primary and secondary standards which qualify it to lead the Arab region and North Africa. The Deadweight machines (force primary standards) are considered as the most important one in force field, it covers the range up to 5MN. The laboratory members work on developing their facilities by manufacturing primary standards in force, hardness and torque.

The laboratory participates in inter-laboratory comparisons organized under BIPM umbrella. The quality system in force primary activity achieve the international recognition in 2009 and its CMC's was published on BIPM-KCDB in 2009, torque CMC's was published in 2015.

The laboratory offers test facilities in parallel with calibration facilities. Tensile tests and hardness tests activities were accredited by EGAC in 2011.

Services

1- Calibration & Testing Services

- 1- Calibration of force transducers, devices and proving rings on dead weight force standard machines up to 5 MN.
- 2- Calibration of force generating systems, force transducers, devices and proving rings on loading frames up to 1500 kN.
- 3- Calibration of universal testing machines (tension – compression – bending).
- 4- Calibration of torque transducers up to 3 kN m.
- 5- Calibration of torque wrenches, devices, multiplier and machines up to 2.5 kN m.
- 6- Calibration of hardness and impact testers.
- 7- Perform impact testing (Izod and Charpy).
- 8- Perform hardness testing (Vickers- Rockwell – Brinell-micro hardness).
- 9- Perform mechanical tests (tension – compression – bending) up to 1200 kN.

2- Training Programs

The laboratory carries out workshops and training courses on force, torque, hardness and material science looking forward to increase the knowledge of those who are interested in its activities.

Some of the training courses

- 1- Calibration of universal testing machines.
- 2- Calibration of force transducers
- 3- Calibration of torque transducers
- 4- Calibration of torque wrenches
- 5- Calibration of hardness testers
- 6- Calibration of impact testers
- 7- Mechanical tests
- 8- Uncertainty evaluation in force calibrations and mechanical tests

3- Consultancy Services

Force and Material Metrology Laboratory provides consultancy services to improve industrial field in force metrology.

Main equipments

1- (a) Primary force measurements

Dead Weight Machine (DWM)

DWM Capacity	Range	CMC ±%
50 kN	0.5-50 kN	0.002
500 kN	10-500 kN	0.002
1000 kN	500-1000 kN	0.01
5 MN	100-5000 kN	0.02



(b) Secondary force measurements loading frame



Loading Frame Capacity	CMC ±%
50 kN	0.02
500 kN	0.02
1500 kN	0.1

2- Torque Measurements

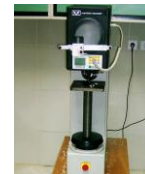
(a) Secondary Calibration Machine

Torque transducers	Range	CMC ±%
20 N·m	1-20 N·m	0.05
3000 N·m	20-3000 N·m	0.05



3- Hardness Measurements (Universal Hardness M/C)

Hardness Types	
HRA,HRB,HRC	(Rockwell)
HV, Micro Hardness	(Vickers)
HB	(Brinell)



4- Impact Measurements

Impact Tester
300 Joule
50 Joule

5- Mechanical tests

Universal testing Machine
1200 kN Universal Testing M/C
400 kN Universal Testing M/C
100 kN Universal Testing M/C



Customers

- 1- Public and private construction companies
- 2- Iron and steel production companies
- 3- Automotive industries
- 4- Packing and pre-packing companies
- 5- Petroleum and drilling companies

Ultrasonic Department

The ultrasound metrology lab is designated the responsibility to establish and maintain the Egyptian measurements in the field of ultrasonic and compare them continuously with the international standards, so that they would be always valid and ready to be used for calibration purposes.

Carrying out scientific research and measuring the physical properties of different materials.

Available services

The ultrasonic laboratory can perform the calibration services according to the international standards as follows:

- Calibration of ultrasonic instruments used for non-destructive testing of materials using pulse echo technique.
- Calibration of ultrasonic standard reference blocks.
- Calibration of different types of ultrasonic transducers (normal, angle and TR probes).
- Calibration of ultrasonic thickness gauges.
- Calibration of ultrasonic flow meters.
- Calibration of ultrasonic cleaners.
- Calibration of AC Yokes.

Testing according to international standards (Detection & Evaluation)

Detection of flaws (defects) inside the materials using ultrasonic techniques is considered as one of the important non-destructive tools. Ultrasonic waves are characterized by the high ability to test the very thick parts as they can pass through the material with no remarkable absorption inside the material. Such criteria are not found in other types of waves (or X-rays). Moreover, there no hazardous effects on people compared to the ionizing radiation testing tools. Furthermore, ultrasound waves are used for testing and thickness measurements of only one sided parts. Therefore, it has different uses in following corrosions in petroleum pipes, testing of welds (especially the thick welds) and detection of defects inside alloys and many other applications in industry and safety.

Training and Advisory

Highly qualified scientists are giving advices and training courses for companies, factories and all organizations working in the field of non-destructive testing of materials.

Researches

High scientific researchers in the field of ultrasonic metrology are qualified and having the ability to characterize and develop the materials and comparing the result data with other methods used for this purpose.

The most important measurements in the laboratory

- 1- Measurement of ultrasonic wave velocities (longitudinal & transverse)
- 2- Calculations of mechanical properties of materials in the micro and nano scales which are compared with those obtained using different techniques.
- 3- Measurement of ultrasonic absorption coefficient (α).
- 4- Study the relaxation phenomena at low temperature.
- 5- Measurement of liquid flow rates in pipes using the ultrasonic flow meter.
- 6- Determination of viscosity using viscometer instrument.
- 7- Measurements of the ultrasonic power of medical transducers.



Customers

- 1-Petroleum Marine Services Co.
- 2-Suez Canal Authority
- 3-National Steel industries
- 4-The Arab contractors
- 5-Seenopex Oil services

Division of Electrical Metrology

Includes 3 Laboratories

- Electrical Quantities Metrology Laboratory
- Time, Frequency & Microwave Metrology Laboratory
- High Voltage Metrology Laboratory

Electrical Quantities Metrology Laboratory

Mission

The department is responsible for maintaining and disseminating the national electrical standards for the quantities of DC voltage and current, resistance, capacitance, inductance and AC/DC transfer. Also, the activities of the information technology laboratory are related to this department. Calibration of the standards and electrical equipments of scientific and industrial laboratories are performed. Scientific research is carried out to improve the calibration measurement capabilities of the department.

Activities

1. Maintenance and dissemination for the national electrical standards of DC voltage, resistance, capacitance, inductance and AC/DC transfer, through the traceability to the SI units.
2. Improving and establishing the quality of the primary, secondary and reference standards by continuous highly accurate internal calibrations.
3. Establishment and development of the measurement standards and methods to realize and maintain the highest levels of accuracy due to many scientific researches.
4. Verifying degree of equivalence of measurements within the department with other national laboratories through international comparisons.
5. Calibration of all related standards and instruments such as voltage and current sources, multi-meters, meggers, testers, RCL meters, and etc.
6. Giving consultation and training for all purposes related to accurate electrical measurements for industry in Egypt, Middle East region and African countries.
7. Many activities related to the information technology field.



Capacitance
Bridge



Josephson Array
Voltage Standard

Time, Frequency & Microwave Metrology Laboratory

Mission

Realizing, maintaining, and developing the national Time and Frequency Standards for Egypt using Cesium Beam Frequency Standard 5071A. Building the Egyptian time scale (UTC (NIS)). Time and frequency dissemination. Also Realizing, maintaining, and developing the national primary standard of high frequency (HF) power for Egypt using Microcalorimeter in the frequency range 10 MHz-18 GHz. Participation in the International Inter-comparisons. Conducting research for enhancing the accuracy and uncertainty of measurements in both the time and frequency metrology and in the microwave metrology. Providing traceability to SI for Electromagnetic Compatibility (EMC) measurements.



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Activities

1. Participation in the international Key comparisons of time and frequency that organized by the International Bureau of Standards and weights (BIPM). Participation in international comparisons for radio frequencies.
2. Calibration of the time interval measuring devices, oscillators (Cesium, Rubidium, Quartz), rotary and planer motion devices, frequency counters, tachometers, oscilloscopes, RF signal generators, spectrum analyzers, microwave power sensors, and cable and Antenna Analyzers, ...etc.
3. Circuit characterization (measurement of scattering parameters and attenuation coefficient) in the frequency range 10 MHz - 40 GHz.
4. Measuring the harmonic content and distortion of signals in the frequency range of 9 kHz - 30 GHz.
5. Providing training, and Consultations.



**Cesium Beam
Frequency Standard
(5071A)**



Microcalorimeter

High Voltage Metrology Laboratory

Mission

High Voltage lab can achieve traceability to SI Unit for measuring and sourcing AC & DC high voltage and high current instruments. Also, the lab can achieve traceability to SI unit for measuring and sourcing power and energy instruments based on the primary standard of electrical power and energy at NIS. Also, HV lab can perform tests that are related to these activities according to international standards. In addition to that, scientific research is carried out to improve the calibration measurement capabilities of the laboratory.

Activities

- Calibration of AC H.V. measuring & sourcing instruments more than 1 kV up to 400 kVAC and 200 kVDC.
- Calibration of AC current measuring & sourcing instruments more than 20 A up to 5000 AAC and 2000 ADC.
- Calibration of partial discharge calibrators up to 2000 pC.
- Calibration of transformer oil testers up to 60 kV.
- Calibration of transformers turns ratio meters.
- Calibration of MEGGERS more than 100 MΩ up to 611 GΩ, with DC voltage source up to 5kVDC.
- Calibration of electrical safety testers.
- Safety tests for electrical household appliances.
- Testing of withstand and breakdown voltage for all types of insulators.
- Calibration of power and energy measuring and sourcing instruments.
- performing the TYPE TEST for all kinds of energy meters
- Testing of phase sequence indicators
- Calibration of power, current, and voltage transducers.



**HV Measuring &
Sourcing Systems**



**Primary Standard for
Electrical Power &
Energy**

Electrical Quantities Metrology Department

Mission: The department is responsible for maintaining and disseminating the national electrical standards for the quantities of DC voltage and current, resistance, capacitance, inductance and AC/DC transfer. Also, the activities of the information technology laboratory are related to this department. Calibration of the standards and electrical equipments of scientific and industrial laboratories are performed. Scientific research is carried out to improve the calibration measurement capabilities of the department.

The department consists of five laboratories:

1. DC Voltage and Current Laboratory :

Since year 2009, the laboratory had the 10V Josephson Array Voltage Standard (JAVS) that represents the SI unit of voltage, as national Standard of DC voltage in Egypt.

The unit of voltage is also maintained via a bank of 38 Weston cells and 13 Zener diode reference standards as Secondary Standards. The traceability of the national unit of voltage is achieving by international comparisons with the similar national measurement laboratories at different countries (NMIs).



Josephson Array Voltage Standard

The laboratory is capable of calibrating DC instruments using either JAVS or other suitable reference, and the total expanded uncertainties at coverage factor $k=2$, are presented in the following table:

Discipline	Range	$\pm U_{exp.} (k=2)$
Josephson array voltage standard	-10V to +10V	≤ 0.2 ppm
Zener Reference Standard	1.018V, and 10V	≤ 500 nV
DC Voltage (Source)	0.1 to 1000V	20 ppm
DC Voltage (measure)	100mV to 1000V	≥ 1 ppm
DC Current (source)	300 μ A to 20A	0.01%
DC Current (measure)	100 μ A to 20A	0.002% - 0.001%

2- Resistance Laboratory:

The unit of resistance is maintained by mean of five One Ohm Thomas type standard resistors traceable to the SI units by calibrating them periodically against the Quantum Hall resistance standards at the BIPM. Moreover, the laboratory has the shown highly accurate resistance measurement system.



It also has two 10 k Ω standard resistors, traceable to BIPM, and two 100 Ω , traceable to NIST, USA. The resistance laboratory capabilities are presented in the following table:

Discipline	Range	$\pm U_{exp.} (k=2)$ $\mu\Omega/\Omega$
Resistance Standards	1 m Ω	0.4
	10 m Ω	0.1
	100 m Ω	0.4
	1 Ω	0.1
	10 Ω	0.1
	100 Ω	0.3
	1 k Ω	0.5
	10 k Ω	0.2
	100 k Ω	4
	1 M Ω	41
	10 M Ω	94
	100 M Ω	761

This Lab. can measure resistance values up to G Ω range.

3- Capacitance and Inductance Laboratory:

This Lab. has some types of capacitance and inductance standards, such as AH Fused Silica capacitance standards which enable the participation in the international comparisons.

Highly accurate capacitance measurements are carried out using the shown Ultra Precision Capacitance Bridge with (option E) which is the first copy of this version in the world.



This bridge has been designed especially to meet the critical requirements of the calibration and research laboratories. This Lab. also has a precise automatic LCR meter and two Gen. Radio bridges for capacitance and inductance measurements.

Some of our standards have been calibrated at the NPL lab, England which is accredited by the UKAS and some of them are traceable to the BIPM. The lab. is capable to calibrate instruments, with the capabilities presented in the following table:

Discipline	Range	$\pm U_{exp.} (k=2)$
AH Fused Silica capacitance standards	1 pF, 10 pF, 100 pF	< 0.7 ppm
Gen Radio capacitance standards	1 nF-10 μ F	10 ppm – 150 ppm
Inductance Standards	10 μ H – 10 H	0.01 μ H- 0.008 H
Highly accurate capacitance measurement	0.8 aF – 1.5 μ F	< 5 ppm
Accurate capacitance measurement	10 aF – 10 μ F	< 0.01 %
Capacitance measurements	100 aF up to 10 F	< 0.05 %
Inductance Measurements	0.1 nH-1111H	0.05 % - 1%

The Lab. can provide standard capacitance values up to mF.

4- AC/DC Transfer Laboratory:

The AC/DC voltage and current standards are traceable to NIST (USA) or PTB (Germany).



The laboratory is capable to calibrate instruments, as presented in the following table:

Discipline	Range	$\pm U_{exp.} (k=2)$
AC/ DC Voltage transfer standard	Thermal Voltage (TVC)	
	0.3V- 1000V, 10 HZ- 1 MHz Micro potentiometer (μ p) 2 mV-500 mV, 10 HZ- 100 kHz	3 ppm- 43 ppm 15 ppm- 150 ppm
AC Current transfer standard	5 mA – 20 A, 10 Hz- 100 kHz	5 ppm-75 ppm
AC Voltage (source)	10 mV - 1000V, 10 Hz -1 MHz	40 ppm- 800 ppm
AC Voltage (measure)	10 mV- 1000 V, 10 Hz - 1 MHz	16 ppm- 600 ppm
AC Current (source)	100 μ A - 20 A, 10 Hz-10 kHz	28 ppm- 740 ppm
AC Current (measure)	100 μ A - 20 A, 10 Hz-10 kHz	24 ppm- 400 ppm

5- Information Technology Laboratory:

Research areas of the Lab. include the following:

- IT in metrology (Automation, Remote metrology, etc...)
- Metrology in IT (Software testing, Network metrology, etc.)

Some national places in Egypt are related and traceable to the quantity of electrical capacitance at the NIS, such as Radiance laboratory in the NIS, Egypt. Such as:

1. Egyptian Air-Force.
2. General Organization for Export and Import Control of Egypt.
3. Center of high voltage researches of Electricity Company of Egypt.
4. National Services Projects Organization (NSPO)
5. El-Sewedy Industries

Time and Frequency and Microwaves laboratory

The Lab had an international recognition since 2012 in measuring the Frequency, the Time Interval and the time scale Difference.

Mission

- Realizing, maintaining, and developing the national Time and Frequency Standard for Egypt using Cesium Beam Frequency Standard 5071A.
- Realizing, maintaining, and developing the national primary standard of high frequency (HF) power for Egypt using Microcalorimeter in the frequency range 10MHz-18GHz.
- Building the Egyptian time scale (UTC (NIS)).
- Participation in the International Intercomparisons.
- Time and frequency dissemination.
- Conducting research for enhancing the accuracy and uncertainty of measurements in both the time and frequency metrology and in the microwaves metrology.
- Providing training.
- Providing Consultations.
- Represent NIS in the technical committee of Electro-Magnetic Compatibility, Measuring Instruments and Electronic Control, and Time at the Egyptian Organization for Standardization and Quality.

International Cooperation

- Participation in the international Key comparisons of time and frequency organized by the International Bureau of Standards and weights (BIPM).
- Represent NIS at the international/regional technical committees in both the time and frequency metrology and in the radio frequency and microwave (RF & MW/EMC) metrology.

Calibration Services

- 1- The time interval measuring devices (ex: stopwatches/timers).
- 2- Oscillators (Cesium, Rubidium, Quartz).
- 3- Frequency Counters.
- 4- Frequency sources (ex., function generators, sweep generators, ... etc).
- 5- Rotary and planer motion devices (centrifuges, mixers, shakers ...etc).
- 6- Tachometers.
- 7- Oscilloscopes.
- 8- RF Signal Generators.
- 9- Spectrum Analyzer.
- 10- Cable and Antenna Analyzer (ex., Site Master).
- 11- Distortion Measurement Devices.
- 12- Attenuators.
- 13- Microwave Power Sensors.
- 14- Electromagnetic Waves Measurement Devices.
- 15- Circuit characterization in the frequency band 10 MHz - 40 GHz (measurement of scattering parameters and attenuation coefficient).
- 16- Measuring the harmonic content and distortion of signals within the frequency range of 9 kHz - 30 GHz.

Testing Services

Measuring the radiation of mobile stations within the frequency range of 0.5 MHz - 5GHz.

Training Services

- 1- Annual Indoor training course.
- 2- Annual Outdoor training course.
- 3- Unplanned training courses according to customer's request.

Main Lab Equipments

- Cesium Beam Frequency Standard (5071A)



- Oscilloscope Calibrator (Fluke 9500B)

- Time Transfer System (TTS)



- Universal Time Interval Counter (SR620)

- Microcalorimeter



- Electromagnetic field probe

- Spectrum Analyzer



- Vector Network Analyzer

Customers

- Authority of National Service Projects.
- Egypt Air.
- General Authority for controlling the exports and imports.
- Eva Pharma.
- Telecom Egypt.

High Voltage Metrology Lab

High Voltage lab can achieve traceability to SI Unit for measuring and sourcing high voltage equipment up to 400 kV. Also , the lab can perform tests that related to high voltage field, according to international standards. Also , high voltage lab has the primary standard of electrical power and energy , so it can achieve traceability to SI unit for measuring and sourcing power and energy instruments.

1)High Voltage & high current unit

(1.1) Calibrations

(1.1.1) High Voltage measurement

- Calibration of AC (50 Hz) H.V. Sources up to 400 kV.
- Calibration of AC (50 Hz) H.V. measuring instruments up to 200 kV.
- Calibration of Impulse test measuring instruments up to 140 kV.
- Calibration of transformer oil testers up to 60 kV.
- Calibration of Potential Transformers (PT) up to 100 KV.

(1.1.2) High Current measurement

- Calibration of AC (50 Hz) Current Sources and measuring Instruments up to 5K A.
- Calibration of DC Current Measuring Instruments up to 2K A.
- Calibration of Current Transformers (CT) ups to 5K A primary current.

(1.1.3) Others

- Calibration of partial discharge Calibrators up to 2000 pC
- Calibration of insulation resistance measuring instruments (MEGGERS) up to 611 GΩ, with DC voltage source up to 5 KV.
- Calibration of C and tan δ measuring instruments.
- Calibration of Transformers turns ratio measuring Instruments

(1.2) Tests

- Testing of break down in transformers oil.
- Testing of insulator AC (50 HZ) breakdown.
- Testing of solid insulator impulse voltage.
- Measuring Capacitance and Dissipation Factor (C & tan δ) of Insulation Samples.

(2) Power and energy unit

This unit has the **Primary Standard of Power** which works in the range of 40-320V & 0.001-100 A with accuracy 30 PPM

However, power and energy unit it self can measure from 40-600V&

0.001-6000 A with all possible phase shifts.

(2.1) Calibrations

- Calibration of sub-standard energy meters of classes 0.1, 0.2 and 0.5%.
- Calibration of energy and power analyzers.
- Calibration of energy and power meters of all kinds (mechanical , electronical ,1 Phase , 3 Phase , directly connected or through PT&CT.
- Calibration of power ,current ,voltage and frequency transducers.

- Calibration of power factor meters for all possible phase shifts.
- Calibration of Phantom loads.
- Calibration of power sources.

(2.2) Tests

- The unit can perform the **TYPE TEST** for all kinds of energy meters.
- Testing of phase indicators.

(3)Electromagnetic compatibility unit

This unit can perform the tests of conducted immunity tests according to IEC 61000-4-X for example electrostatic discharge , surge , fast transient burst, damped oscillatory wave.

* Radiated immunity testing system is under construction

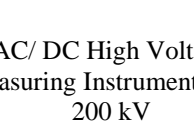
Equipment

Primary Standard for
Electrical Power & Energy



Reference Standard for Power
& Energy Meters

AC/ DC High Voltage
Measuring Instrument up to
200 kV



AC/ DC High Current Power
Source up to 5000 A AC



Surge Generator



Costumers

- 1- El Sewedy Cables Group
- 2- Ministry of Electricity and Energy
- 3- Inpi Company
- 4- The General authority for controlling on exports and imports
- 5- New and renewable energy authority

Division of Thermometry & Ionizing Dosimeter Metrology

Includes 2 Laboratories:

- Ionizing Radiation Metrology Laboratory (IRML)
- Thermal Metrology Laboratory (ThML)

Ionizing Radiation Metrology Laboratory (IRML)

IRML is one of the departments of Metrology of Heat and Ionizing Radiation Division at the National Institute for Standards. It is assigned to calibrate ionizing radiation measuring instruments on the national level according to law establishing the institute and the labor law of radioactive sources. IRML is a member of the International Atomic Energy Agency / the World Health Organization (IAEA/WHO) network of Secondary Standard Dosimetry Laboratories (SSDLs) since 1977, for high dosimetric accuracy particularly in external beam radiation therapy and other fields.

The department possess secondary standard systems used for measuring ionizing radiation with high accuracy in medical (diagnostic and therapeutic), industrial and environmental fields which are traceable to SI units in BIPM-Paris.

Vision

Holding, dissemination and developing of national standards for radiation dosimetry units.

Mission

- 1- Calibration of radiation measuring instruments.
- 2- Provide traceability to national standards of radiation measurements to users in Egypt.
- 3- Development of primary and secondary standard dosimetry system.

National Activities

- Development of calibration methods for different levels of radiation doses.
- TLD personal dosimetry and radiation workers.
- Performing calibrations for radiation measuring equipments used in different applications.
- Low level background activity measurements.
- Providing technical consultation and advice upon request to industry, medicine and other sectors.
- Researches in the fields of producing and testing new radiation dosimeters and calibrations.
- Participation in the national and international conferences.
- Organizing special training courses in the fields of :
 - Radiation dosimetry.
 - Calibration techniques.
 - Radiation protection.
 - Types of ionizing radiations and its interaction with matter.

International Activities

Participation in annual international audits organized by SSDL network at the following fields:

- TLD audit in radiotherapy level
- TLD audit in protection level
- Transfer chamber therapy level.
- **Recent participation at the intercomparison organized by regional metrology organizations (RMOs) for the:**
 - APMP high dose CO-60
 - APMP. RI (I)- K 1.1
 - APMP. RI (I)- K 4

Instruments and Equipments

1-Radioactive Sources

1. γ -ray sources: (Cobalt-60) with different activities 5 mCi, 5 Ci and 550 Ci and Cs-137 with activity 500 Ci used for :
 - Calibration of different gamma ray detectors.
 - Calibration of survey meters.
 - Calibration of personal dosimeters.
 - Samples irradiation.
2. Neutron sources: Am-Be with activities; 1 Ci, 5 Ci and Cf-252 with 0.00168 activity Ci used for:
 - Calibration of neutron survey meters.
 - Calibration of different types neutron ionization chambers.
 - Samples irradiation.
3. Radon and alpha particle sources used for:
 - Measurement of radon concentration.
 - Calibration of radon detectors.
 - Calibration of radon gas sources.

2- Equipment

- 1- Reference standard dosimetric systems including different electrometers such as NPL, Farmer & Unidos and different ionization chambers for different radiation ranges and applications calibrations.
- 2- Neutron monitors and neutron ionization chambers.
- 3- TLD systems (type 4500 and 6600) for personal protection level dosimetry.
- 4- Electron Spin Resonance system used for :
 - Measurement of high doses radiation.
 - Dose calibration for high activity gamma ray sources (sterilization and food irradiation doses).
 - Measuring the number of free radicals in organic and inorganic samples.



EgyptNIS



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Thermal Metrology Laboratory (ThML)

Temperature is one of the most important of all physical quantities. Measuring and controlling of temperature play an important role in the fields of industry, environment, health and scientific research. The main job of the Lab. is to realize the unit of thermodynamics temperature Kelvin by realizing the international temperature scale (ITS-90).

ThML Activities

Thermometry, Humidity, Viscosity and Thermal analysis.

Thermometry

The primary standards of temperature, based on TPW and other fixed points, called the thermal equilibrium states, are well established at NIS as per International Temperature Scale of 1990 (ITS-90) in the form of sealed cells of high purity materials.

The temperature scale at ThML from 54 K to 962 °C, (FPs O₂, Ar, Hg, Sn, Zn, Al, Ag) is realized by SPRT with uncertainty varying from ± 0.14 m °C at TPW (0.01 °C) to maximum ± 5 m °C at Ag point (961.78 °C). NIS is constructing a State-of-the-Art cryostat for highly accurate temperature measurements down to 6.5 Kelvin.



In the thermocouple thermometry, the range from 0 °C to 1554 °C is realized by standard Type-S & R TCs with uncertainty varying from ± 0.32 °C to ± 0.8 °C. ThML offers thermocouple calibration at high temperature with ultra-low uncertainties in the novel cobalt-carbon (Co-C, 1324 °C) and palladium-carbon (Pd-C, 1492 °C) eutectic fixed points of 0.55 °C and 0.7 °C.

The radiation temperature scale has been established by installing photoelectric linear pyrometer, LP4 and realizing the silver point (Ag, 961.78 °C) and copper point (Cu, 1084.62 °C) in the form of metal-in-graphite blackbodies with an uncertainty better than ± 0.02 °C.

Relative humidity calibrations are offered at primary level (calibration directly against a national standard humidity generator) or at a secondary level (against a traceably calibrated transfer standard hygrometer). ThML offers facilities for moisture content in: concrete, flowers, wood and other building materials. package grain, range **from 6% - 40%.**



Realization and extension of the National viscosity scale with an uncertainty of $\pm 0.25\%$ starting from 1.0035 mm²/S up to 200000 mm²/S at wide temperature ranges, from -20 °C up to 100 °C. Calibration of all types of viscometers and oils.

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ThML Services

- Calibration of SPRT in the range from 54 K up to 962 °C.
- Calibration of Infrared (Pyrometers) in the range from 960 up to 2300 °C.
- Calibration of Liquid in Glass Thermometers within the range from 0 °C up to 400 °C.
- Calibration of all types of thermocouples from 0 °C to 1100 °C by comparison with standard Pt10%Rh vs Pt thermocouples which have been calibrated on the ITS-90.
- Calibration of all kinds of viscometers and determination of viscosity of liquids.
- Calibration all kinds of hygrometers, thermo-hygrometers and data loggers in the range from -80 °C up to 100 °C.
- Determination of calorific values and thermal properties of materials.
- Validation system (temperature and relative humidity) is used for calibration, validation, thermal mapping for climatic chambers (walk in and bench top), and incubators and Heat penetration study by using penetrating sensor.
- Can give experimental training courses in calibration of thermometers, viscometers, hygrometers and calorimetric measurements.

Ionizing Radiation Metrology Laboratory (IRML)

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- 4- Electron Spin Resonance system used for :
 - Measurement of high doses radiation.
 - Dose calibration for high activity gamma ray sources (sterilization and food irradiation doses).
 - Measuring the number of free radicals in organic and inorganic samples.
- 5- Hyper pure Germanium and sodium iodide with multi-channels analyzer systems used for:
 - Calibrations of hyper pure germanium and sodium iodide detectors.
 - Efficiency determination for different types of hyper pure germanium and sodium iodide detectors.
 - Radioactive leakage measurements from different sources.
 - Specific activity measurements for powder and liquid samples.
- 6- X-ray irradiation machine for calibration of ion chambers in different beam quality and samples irradiation.
- 7- Environmental radon gas concentration measuring system.
- 8- Image analyzer system for nuclear track counting in solid state detectors and imaging different samples.



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The radiation temperature scale has been established by installing photoelectric linear pyrometer, LP4 and realizing the silver point (Ag, 961.78 °C) and copper point (Cu, 1084.62 °C) in the form of metal-in-graphite blackbodies with an uncertainty better than ± 0.02 °C.

Relative humidity calibrations are offered at primary level (calibration directly against a national standard humidity generator) or at a secondary level (against a traceably calibrated transfer standard hygrometer). in the range from 10 to 98 % relative humidity and from -70 °C to 180 °C temperature ThML offers facilities for moisture content wood and other building materials. package grain, with uncertainty range from $\pm 0.5\%$ to $\pm 1\%$.



ThML offers facilities for Dew point meters calibration in the range from -50 °C to +50 °C dew point temperature



Realization and extension of the National viscosity scale with an uncertainty of $\pm 0.25\%$ starting from 1.0035 mm²/S up to 200000 mm²/S at wide temperature ranges, from -20 °C up to 100 °C. Calibration of all types of viscometers and oils.

ThML Services

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- Calibration of all types of thermocouples from -80 °C to 1100 °C by comparison with standard thermocouples which have been calibrated on the ITS-90.
- Calibration of all kinds of viscometers and determination of viscosity of liquids.
- Calibration all kinds of hygrometers, thermo-hygrometers and data loggers in the range from -80 °C up to 170 °C & 10% to 98%.
- Determination of calorific values and thermal properties of materials.
- Validation system (temperature and relative humidity) is used for calibration, validation, thermal mapping for climatic chambers (walk in and bench top), and incubators and heat penetration study by using penetrating sensor.
- Experimental training courses in calibration of thermometers, viscometers, hygrometers and thermal properties measurements.

Customers

- 1- Armed Force.
- 2- EZZ Steel
- 3- EL- Sweedy for Cables
- 4- Egypt Air
- 5- Vacsera
- 6- Fa
- 7- Encon

Division of Chemical Metrology

Includes 5 Laboratories:

- Textile Metrology Laboratory
- Polymer Metrology & Technology Laboratory
- Fire & Explosion Protection Laboratory
- Reference Materials Laboratory
- Nano Metrology & Technology Laboratory

Textile Metrology Laboratory (TML)

Textile Metrology Lab., National Institute for Standards (TML-NIS) was established to be the National Textile Laboratory of Egypt. Actually, the TML lab satisfies the requirements of ISO/IEC 17025 for the textile testing activities. It performs various tests and measurements required for human safety; hazardous and environmental impacts in textile industries (eco-label and ecotex); evaluates indoor environmental monitoring (Hospital and clean rooms, microbiological and calibration labs and sterilized areas).

TML also performs a wide range of calibrations most of the chemical analysis equipment such as: air, liquid and gases velocity, flow meters, particulate counters, beside, training and consultancy services to our customers.



Polymer Metrology & Technology Laboratory (PMTL)

PMTL provides various industrial sectors with calibration and testing activities and conducting scientific research that offers practical solutions to industrial problems according to international standards. This is in addition to training and consultancy services related to these fields. Our laboratory is accredited by Egyptian Accreditation Council (EGAC) in measuring tensile strength for plastics and rubbers.

Activities

1- Calibration

Calibration of Hardness Tester (Shore A & Shore D).

2- Testing

Measurement of physical and chemical properties of polymers (Plastics, Rubber, Foam, Paints... etc.).

3- Training and consultancy

PMTL provides technical consultancy for the Egyptian industry, universities and research centers. PMTL conducts workshops and training sessions for polymer metrology & applications.

4- Scientific research

Providing practical solutions to industrial problems based on advanced scientific research

Examples of some instruments exist in PMTL

Tensile testing machine

Testing of tensile strength, elongation, compression, bending, tear for different types of materials



High Temperature Gel Permeation Chromatography (HT-GPC)

Measurement of molecular weights viscosity and branching of polymers, at temperature range (30:220°C)



Dynamic Mechanical Thermal Analysis

Measures different polymer properties such as: storage and loss modulus, glass transition temperature (T_g) etc.



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EgyptNIS



EgyptNIS



EgyptNIS



Fire & Explosion Protection Laboratory

The laboratory represents the main gate for protection for fire and explosion in Egypt.

The FEP performs varieties of tests, calibrations, consultants and training for all sectors in Egypt in the field of fire and explosion protection. All these services performed based on the international standards in these fields. This is in addition to doing advanced scientific research in synthesis, characterization and application of new flame retardant materials. This in conjunction to preparation and characterization of reference material in the field of fire and explosion protection.



Reference Materials Laboratory

Quality of chemical measurements is an important issue in today's world influencing quality of life, border-cross trade and commerce. On an international scale, the world of chemical measurements is undergoing major changes. Since a decade initiatives have been taken at an international level and across the measurement sectors to ensure that the measurement science issues are applied in a systematic way. This is done to improve the quality of chemical measurement results and thus make them acceptable everywhere.

Mission

- Reference materials Laboratory is primary metrology laboratory (Metrology in Chemistry), it develops national measurement standards (CRM).
- Development and improvement of certification, harmonization and compatibility of reference materials with international standards.
- Dissemination of traceability to the national system and through it to the international system.
- Cooperation with international and regional metrology organizations [RMOs] for transferring knowledge to national system.
- RM Lab. offers technical support to industry in everything related to measurements, reference materials and data to establish traceability of their measurements.



Nano Metrology & Technology Laboratory

The Laboratory is under construction.

Textile Metrology Laboratory (TML)

Textile Metrology Lab., National Institute for Standards (TML-NIS) was established to be the National Textile Laboratory of Egypt.

It can be considered as a pivot reference lab for all interested quality control and inspection parties in textile and its allied industries. Actually, the TML lab satisfies the requirements of ISO/IEC 17025 for the textile testing activities. TML performs various tests and measurements required for human safety; hazardous and environmental impacts in textile industries (e, g. eco-label and ecotex); evaluates indoor environmental monitoring (Hospital and clean rooms, microbiological and calibration labs and sterilized areas). TML also performs a wide range of Calibrations most of the chemical analysis equipment such as: air, liquid and gases velocity, flow meters, particulate counters.

TML calibrates FTIR using certified reference materials traceable to SI measurement system. Researches on the characterization of developed materials including nonmaterials, biomaterials and advanced materials were done. TML has many published work on textile chemistry and chemical technology, Waste water treatments, clean energy, kinetics, environmentally and healthy accepted materials.

Research Topics

- Textile chemistry and chemical technology (finishing, printing dyeing, coating, kinetic)
- Natural Non Fibrous BioPolymers
- Water analysis and purification
- Chemical metrology
- Standard reference materials
- Conservation of Archaeological materials
- Color measurements
- Detection of residual heavy elements, pesticides, harmful chemical compounds

Services

Calibration Services

- 1- Liquid conductivity meter
- 2- Turbidity meter
- 3- Air velocity flow meters
- 4- Kjeldahl apparatus
- 5- Karl Fisher
- 6- Laminar flow
- 7- FTIR
- 8- Flame photometer
- 9- COD and BOD equipment
- 10- Crockmeters
- 11- Leather testing instruments
- 12- Textile Testing instruments
- 13- Safety Biological cabinets

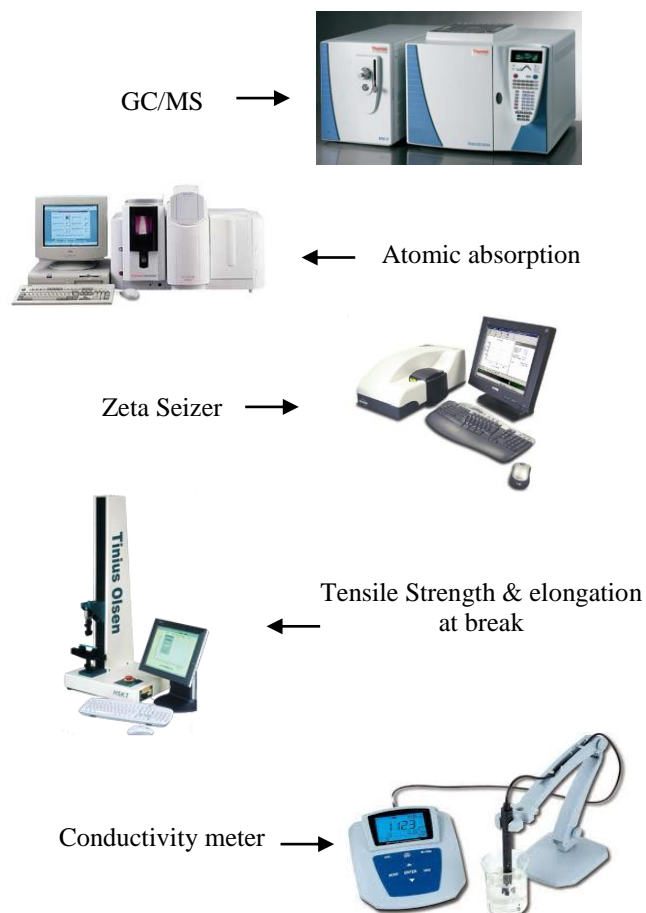
Consultancy Services

- 1- Textile, carpet, yarn, wall covering (finishing, processing, dyeing... wet processing)
- 2- Outdoor air and water pollution
- 3- Indoor environmental monitoring
- 4- Referee between different parties in textile technical and processing aspects.
- 5- Archeological conservation

Training Programs

- 1- International Publication in ISI Journals
- 2- Plagiarism Checker
- 3- Finishing, dyeing and Printing of Textiles
- 4- Principals of analytical chemistry for environmental analysis
- 5- ECO-label and Eco-Tex and uncertainty estimation for textile testing
- 6- Edible and industrial waste water standards for water testing labs
- 7- Principal of nonwoven materials
- 8- Atomic absorption analysis
- 9- Qualitative and Quantitative analysis using FTIR
- 10- Chromatographic Analysis (qualitative and quantitative)
- 11- Carpet testing
- 12- Basics Textile (Mechanical, Physical and Chemical)
- 13- Advanced Textile (Mechanical, Physical and Chemical)

Equipments



Costumers

- 1- Ministry of defense
- 2- Ministry of Health
- 3- Textile companies
- 4- Universities
- 5- Research Centers

Polymer Metrology & Technology Lab. (PMTL)

PMTL provides various industrial sectors with calibration and testing activities and conducting scientific research that offers practical solutions to industrial problems according to international standards. This is in addition to training and consultancy services related to these fields. Our laboratory is accredited by Egyptian Accreditation Council (EGAC) in measuring tensile strength for plastics and rubbers.

Activities

I. Calibration

Calibration of Hardness Tester (Shore A & Shore D).

II. Testing

Measurement of physical and chemical properties of polymers (Plastics, Rubber, Foam, Paints... etc.).

- 1-Measurement of hardness (Shore A & Shore D)
- 2-Measurement of density & viscosity
- 3-Rheological measurements for rubber
- 4-Abrasion resistance for rubber
- 5-Resilience testing
- 6-Fatigue testing
- 7-Impact resistance for plastics
- 8-Plasticity for rubber
- 9-Melt flow index for plastics
- 10- Dynamic mechanical thermal analysis
- 11- Loss modules / storage modules and glass transition tempura for polymers

III. Training and consultancy

- 1-PMTL provides technical consultancy for the Egyptian industry, universities and research centers.
- 2-PMTL conducts workshops and training sessions for polymer metrology & applications.
- 3-PMTL helps the Egyptian industry solving production problems based on scientific research basics.

IV. Scientific research

Providing practical solutions to industrial problems based on advanced scientific research focused on seven main topics:

- 1-Polymer composites and nanocomposites
- 2-Certified reference material
- 3-Adhesion of polymers to other materials
- 4-Polymer morphology and structure property relationship
- 5-polymer and organic solar cells
- 6-Green polymer
- 7-Paint materials

Examples of some instruments exist in PMTL

Tensile testing machine

Testing of tensile strength, elongation, compression, bending, tear for different types of materials such as: rubbers, plastics, foams, cords, textiles, etc. in the range (100N:10kN)



Melt Flow Index

It determines the rate of flow for thermoplastic materials

High Temperature Gel Permeation Chromatography (HT-GPC)

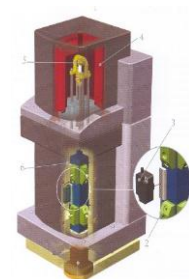


Measurement of molecular weights (M_w , M_n , PDI,...), viscosity and branching of polymers, at temperature range (30:220⁰ C)

Dynamic Mechanical Thermal Analysis (DMTA)

It measures different polymer properties such as:

Storage and loss modulus, glass transition temperature (T_g), creep and stress relaxation, damping property ($\tan \delta$), crosslink densities, etc.



Hardness Tester & Calibration



Calibration of hardness testers (shore A & D)

Testing the hardness of rubber (shore A) and plastic materials (shore D).

Customers

- 1-Mobica
- 2-El Swedy Cables
- 3-Techno Net
- 4-Air Forces
- 5-Misr Cables

Fire and Explosion Protection Laboratory (FEP)

The laboratory represents the main gate for protection for fire and explosion in Egypt. The FEP performs varieties of tests, calibrations, consultants and training for all sectors in Egypt in the field of fire and explosion protection. All these services performed based on the international standards in these fields. This is in addition to doing advanced scientific research in synthesis, characterization and application of new flame retardant materials. This in conjunction to preparation and characterization of reference material in the field of fire and explosion protection. The Laboratory has been accredited according to ISO 17025 in some of testing services.

Types of services offered by FEP

Calibrations

- Calibration of toxic and flammable gases analyzer
- Calibration of lower explosion limits (LEL) apparatus.
- Calibration of PH meters instruments.
- Calibration of flash point instruments.
- Calibration of smoke point.
- Calibration of oxygen analyzer.

Tests

- Measurement the flammability properties for various materials such as building materials, woods, polymers and textiles using different standard methods and measurement their smoke toxicity.
- Measurement of safety characteristic data for flammable liquids & gases.

Training and Consultations

- 1- FEP lab presents consultations for different life sectors in the field of fire & explosion protection.
- 2- FEP provides advanced training in fields :
 - Calibration of gases analyzers.
 - Calibration of lower explosion Limit (LEL) apparatus.
 - Calibration of PH Meter.
 - Calibration of flashpoint.
 - Industrial Safety.
 - Uncertainty calculations in fire tests.

Research Field

- Synthesis and production of fire retardant and smoke suppressant materials.
- Preparation and Characterization of reference materials in fire and explosion protection.
- Advanced researches in the field of explosion protection.

Examples of some instruments existin FEP

Cone calorimeter instrument for flammability measurement of materials.



Smoke box instrument for smoke measurement released from materials.



Single burning Item instrument for half industrial scale measurement of flammability



UL94 flame chamber instrument for measuring rate of burning of different materials.

IMO flame spread instrument for measuring flame spread in different materials



Cable test instrument for measuring the flame spread of electrical cables.

Customers

- 1- National Research Center
- 2- Egypt Air
- 3- Fyzer Medical Company
- 4- Lafarge Cement Company
- 5- El Swedi for Caples

Reference Materials Laboratory

Quality of chemical measurements is an important issue in today's world influencing quality of life, border-cross trade and commerce. On an international scale, the world of chemical measurements is undergoing major changes. Since a decade initiatives have been taken at an international level and across the measurement sectors to ensure that the measurement science issues are applied in a systematic way. This is done to improve the quality of chemical measurement results and thus make them acceptable everywhere.

Mission

- Reference materials Laboratory is primary metrology laboratory (Metrology in Chemistry), it develops national measurement standards (CRM).
- Development and improvement of certification, harmonization and compatibility of reference materials with international standards.
- Dissemination of traceability to the national system and through it to the international system.
- Cooperation with international and regional metrology organizations [RMOs] for transferring knowledge to national system.
- RM Lab. offers technical support to industry in everything related to measurements, reference materials and data to establish traceability of their measurements.

Reference Materials for Water Quality Testing

Reference Materials Laboratory has released a number of RMs for water testing:

- Anions standard solutions
- Elemental standard solutions
- TDS and TSS standard solutions
- pH and conductivity standard solutions
- Pesticides standard solutions

Reference Materials for Health and Food Quality Testing

Reference Materials Laboratory has released a number of RMs for health and Food Quality testing:

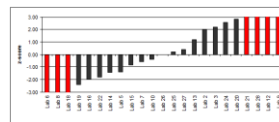
- Vitamins Reference Materials (Milk powder and Infant Formula)
- Tocopherols in vegetable oils (Wheat Germ, Olive and Corn Oils)
- Caffeine Reference Materials (Chocolates and Beverages)
- Anions and Cations standard solutions

Function

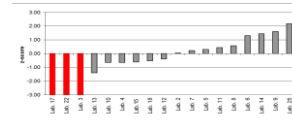
- Calibration of chemical measurement systems
- Assessment of analytical methods
- Testing of measurement devices
- Organization of inter-laboratory comparisons
- Design of quality assurance programs
- Identification and qualitative analysis of customers samples
- Education and training

Application fields

- Food and Agriculture (meat, fish, vegetable etc.)
- Environment analysis (mater, soil, sediment etc.)
- Biological and clinical testing (blood, urine etc.)
- Metals analysis (ferrous, nonferrous etc.)
- Chemicals testing (gas, solvents, paints etc.)
- Pure materials (chromatography, isotopes etc.)
- Industrial raw materials and products (fuels, glass, cement etc.)



PT results for PH measurement using NIS prepared reference material



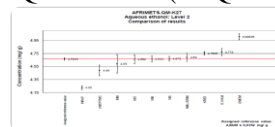
PT results for cefapirin antibiotic measurement using NIS prepared reference material

Services to the customers

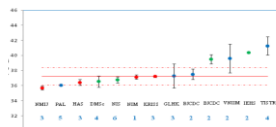
- Certified Reference Materials (CRMs)
- Calibration of equipment used for chemical measurement
- Testing of Anions, cations in different matrices, preservatives in food, beverage and cosmetics, VOC's in water and soil, Alloys and identifying stainless steel grades.
- Training in chemical metrology topics (Uncertainty, Method validation, selection and use of RM, quality control techniques, statistical data analysis and Correct use of measuring equipment,

International Activity

Reference Materials Laboratory successfully participated in some key comparisons with AFRIMETS and APMP e.g. CCQM-K27 and (CCQM-P128



RML result in AFRIMETS.QM-K27 Determination of Ethanol in Aqueous Matrix



RML result in CCQM-P128, Lead measurement results in cosmetic cream

Equipment and Facilities

Reference Materials Laboratory is equipped with modern and sophisticated equipment as follow:

- 1- X-Ray Fluorescence Spectrometer (XRF) →



- 2- Gas Chromatograph- Mass Spectrometry (GCMS) ←



- 3- X-Ray powder Diffraction Spectrometer →

Customers

- 1- ...
- 2- ...
- 3- ...
- 4- ...
- 5- ...

Division of Photometry and Radiometry Metrology

Includes 2 Laboratories:

- Photometry Laboratory
- Radiometry Laboratory

Photometry Laboratory

The photometry laboratory is a part of photometry and radiometry metrology division. The laboratory is responsible for realization and maintenance of the basic units of photometry including luminance intensity, luminous flux, illuminance luminous according to CIE definitions.

The main photometric Quantities

- 1-Luminous intensity of light sources
- 2-Correlated color temperature of light sources
- 3-Luminous flux
- 4-Illuminance
- 5-Luminance



Luminous intensity system

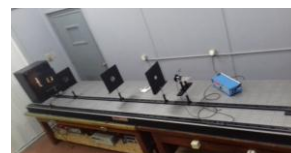
- 3-Standard illuminance meter (range 0.1 mlux – 600000 lux)
- 4-Standard photometer for candela realization
- 5-Standard Integrating Sphere
- 6-Standard Colorimeter
- 7-Filters for calibrating spectrophotometer.
- 8-Color standards
- 9-Gloss Standards

Spectrophotometric Quantities

- 1-Spectral transmittance& spectral absorbance measurements in the range 200-3000 nm
- 2-Spectral reflectance measurements for materials in the range 200-3000 nm
- 3-Luminous Transmittance &luminous Absorbance
- 4-Opacity measurements
- 5-CIE, ASTM, Gardener and Saybolt scales
- 6-Whiteness measurements for grey materials such as papers and ceramics
- 7-Calibration of spectrophotometers
- 8-Gloss measurements for glazed surfaces



Color measurement system



Luxmeter Calibration System



Spectrophotometer Cary 5000



Spectrophotometer UV-3101



Luminous Flux Measurement system

Photometry CMC

International Comparison at luminous Intensity (APMP)

Researches in the field of

- 1-Characterization of standard instruments for photometric applications.
- 2-Uncertainty calculation for photometric measurements .
- 3-Color measurements.

Standards in photometry laboratory

- 1-Standard Lamps for photometric quantities such as luminous flux and luminous intensity lamps.
- 2-Standard Spectrophotometer in the range of 200– 3000nm.



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Radiometry Laboratory

Radiometry is the field of metrology related to the physical measurement of the properties of the optical portion of the electromagnetic radiation, including all spectral regions from the ultraviolet (UV) to the visible (VIS) and infrared (IR).

The mission of the radiometry laboratory is to realize, maintain and disseminate the radiometric quantities such as the spectral power responsivity of different optical detectors, (A/W or V/W), and spectral irradiance of light sources or irradiated surfaces, (W/cm^2).

Activities and services

Optical radiation measurement is one of the main areas of metrology developed and realized at NMIs and distributed by them to many users in the industrial, retail, engineering and scientific communities. Some of our applications are in the areas of astrophysics, metrology and atmospheric physics, material science, Airplane and Petroleum companies, solar energy research centers, manufacture of light sources companies, phototherapy, pharmaceutical manufactures, microbiology laboratories and water purification companies,.....etc.

Laboratory services

1. Calibration

- UVA Optical radiometers peaked at 365 nm, measured in $\mu\text{W}/\text{cm}^2$.
- UVC Optical radiometers peaked at 254 nm, measured in $\mu\text{W}/\text{cm}^2$.
- UVB Optical radiometers peaked at 312 nm, measured in $\mu\text{W}/\text{cm}^2$.
- Phototherapy radiometers at 450 nm.
- Spectral power responsivity of different optical detectors, 250 nm - 1100 nm, measured in (A/W) or (V/W).
- Precision of spectroradiometers.
- Precision of spectroscopy of FTIR spectrometers.

2. Testing

- Measuring the spectral power distribution of ultraviolet sources, 250 nm - 400 nm.
- Measuring the spectral power distribution of optical sources, 250 nm - 1700 nm.
- Performance of UV lamps in biological safety cabinets.
- Linearity of optical detectors.
- Spatial responsivity of optical detectors.
- Irradiance of phototherapy Luminaires.

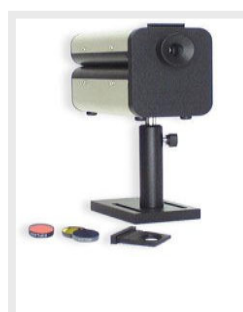
3. Training courses

- Optical measurements and its applications.
- General course in radiometry science and its application.
- Ultraviolet radiation, measurement ,applications, and Hazards
- Performance of Phototherapy Equipments.

standard devices

- Standard Silicon Trap detector 300nm to 1000nm.
- Standard Filter Radiometer.

- Spectroradiometer working in the range from 250 nm to 1700 nm.
- Standard optical sources emit in the range from 250 nm to 2400 nm.
- Calibrated optical detectors working in the range from 250 nm to 1100 nm..
- Incandescent lamps 1000 W.
- Mercury arc lamps 500 W.
- Calibrated radiometers at 254 nm, 365 nm , 312nm , and 450 nm.
- Standard radiometer for measuring the power and energy of lasers.
- Optical Pyroelectric radiometer scanner to measure photo-radiation in watts.



Pyro-Electric Radiometer



Laser Power Radiometer



Double - Monochromator



Mini- Spectrometer



Mercury arc lamp 500 W



Laser power Radiometer

Photometry Laboratory

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The main photometric Quantities

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Spectrophotometric Quantities

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- 6-Whiteness measurements for grey materials such as papers and ceramics
- 7-Calibration of spectrophotometers
- 8-Gloss measurements for glazed surfaces



Photometry CMC

International Comparison at luminous Intensity (APMP)

Researches in the field of

- 1-Characterization of standard instruments for photometric application.
- 2-Uncertainty calculation for photometric measurements .
- 3-Color application.

Customers

- 1-Egypt air company.
- 2-Egyptian organization of standards (EOS) .
- 3-VACSERA.
- 4-Laboratories of ministry of health, ..etc .
- 5-Paint & oil factories
- 6-Paper companies.
- 7-Luminaire factories.
- 8-General origination for export and import control
- 9-Military factors.
- 10- Chemical & medical companies.
- 11- Petrol Companies.
- 12- Paint & oil factories
- 13- Textile Factories.
- 14- Lamps factors.
- 15- Water and wastewater companies.

Standards in photometry laboratory

- 1-Standard Lamps for photometric quantities such as luminous flux and luminous intensity lamps.
- 2-Standard Spectrophotometer in the range of 200 – 3000nm.
- 3-Standard illuminance meter (range 0.1 mlux – 600000 lux)
- 4-Standard photometer for candela realization
- 5-Standard Integrating Sphere
- 6-Standard Colorimeter
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- 8-Color standards
- 9-Gloss Standards

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- Precision of spectroradiometers.
- Precision of spectroscopy of FTIR spectrometers.

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- Performance of UV lamps in biological safety cabinets.
- Linearity of optical detectors.
- Spatial responsivity of optical detectors.
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3. Training courses

- Optical measurements and its applications.
- General course in radiometry science and its application.
- Ultraviolet radiation, measurement ,applications, and Hazards
- Performance of Phototherapy Equipments.

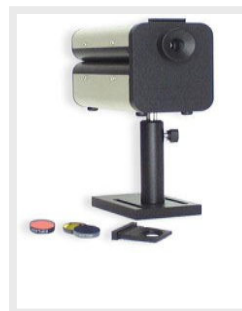
Our standard devices

- Standard Silicon Trap detector 300nm to 1000nm.
- Standard Filter Radiometer.
- Spectroradiometer working in the range from 250 nm to 1700 nm.
- Standard optical sources emit in the range from 250 nm to 2400 nm.

- Calibrated optical detectors working in the range from 250 nm to 1100 nm..
- Incandescent lamps 1000 W.
- Mercury arc lamps 500 W.
- Calibrated radiometers at 254 nm, 365 nm , 312nm , and 450 nm.
- Standard radiometer for measuring the power and energy of lasers.
- Optical Pyroelectric radiometer scanner to measure photo-radiation in watts.

Our most common customers

- Aero plane Engine factory.
- Petroleum Services Company.
- The Arabic industrial organization.
- Medical Product Company.
- Aircraft Maintenance Companies.
- Engine Companies.
- Lamp manufacturers and suppliers.
- Various medical phototherapy centers.
- Phototherapy hospitals.



Pyro-Electric Radiometer



Laser Power Radiometer



Double - Monochromator



Mini- Spectrometer



Mercury arc lamp 500 W



Laser power Radiometer

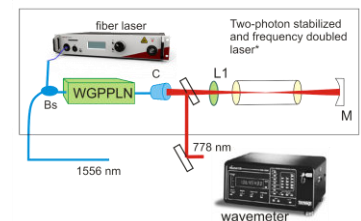
Division of Length Metrology & Precision Engineering

Includes 3 Laboratories:

- Primary Length Standard & Laser Technology Lab.
- Engineering & Surface Metrology Lab.
- Line & End Secondary Standards Lab.

Primary Length Standard & Laser Technology Laboratory

In Egypt, the primary length standard is an iodine-stabilized He-Ne laser with a relative standard uncertainty of $\pm 2.5 \times 10^{-11}$. The Primary Length Standard and Laser laboratory offers different calibration services that range from measuring the frequency and wavelengths of lasers used in length metrology as well as different other applications. In order to do this, the laboratory uses femto-second frequency comb and the primary laser as well as wavemeters. Characteristics of medical lasers can also be measured at our laboratory. For telecommunications sector, the laboratory offers calibration of their measuring equipment that are used in optical telecommunication analysis like (OTDRs, SDH analyzers, laser sources, variable attenuator ...etc.), The laboratory can calibrate different other equipment like, distance meters, range finders, total stations, laser alignment kits, Laser Doppler velocimeters (that are used for cable length measurement) and GPS receiver systems.



Line & End Secondary Standards Laboratory

The laboratory of End and Line Standards is one of the laboratories of the division of Length Metrology and Engineering Precision. The laboratory provides traceability to industrial units as it keeps, maintains, and calibrates the secondary standards of length. It also provides testing of optical components and optical devices in accordance with the international standards.

The laboratory provides consultation to industrial units in addition to the training courses and research works that serve industrial and scientific sectors in the field of measurement of length, displacement, material properties, polarization, and refractive indices.

Calibration and measurement services

- 1- Calibration of short end standards "gauge blocks" using laser



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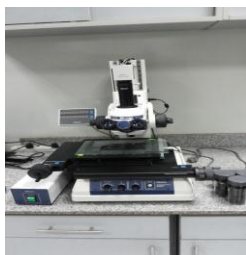
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Email : pr.nis.eg@gmail.com



- 2- Calibration of long end standards “gauge blocks” using laser.
- 3- Calibration of different scales and encoders.
- 4- Calibration of graduated lenses.
- 5- Calibration of auto-refractometers
- 6- Calibration of standard quartzes.
- 7- Calibration of polarimeters
- 8- Ellipsometric measurements.
- 9- Calibration of Fine dimensions using dimensional microscope.
- 10- Calibration of displacements and straightness.



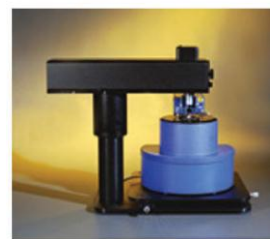
Engineering & Surface Metrology Laboratory

The ESM Lab is within the Division of Length Metrology and Precision Engineering (LMPE) at NIS

Scope

The ESM lab is responsible for carrying out researches, calibration and measurements in the following fields:

- Metrology of universal, Coordinate measuring machines (UMMs; CMMs) as well metrology of machine tools (m/c tool metrology)
- Metrology of geometrical shapes (three dimensional, compound shapes, free shapes.
- Metrology of angles.
- Metrology of gauges and simple measuring tools (calipers, micrometers ... etc).
- Metrology of Surfaces.
- Metrology of non-contact system and applications of optical and interferometric methods of length measurements.
- Measurements protocols and innovated methods for production metrology (inspection and quality control).
- Long distance measurements and calibrations.
- Nanometrology and metrology of thin films.



Primary Length Standard & Laser Technology Laboratory (PLS)

The laboratory maintains the internationally recognized primary length standard, which is a wavelength of an ultra-stabilized laser. All length measurement activities in Egypt should be traceable to this standard. The laboratory also offers calibration services for laser devices that are used in length measurements, medical applications, and optical fiber communications. In addition, laboratory offers calibration service for the GPS position determination equipment.

The unit of the length “the meter” is defined in 1981 as “The length traveled by light in vacuum during a time interval of $1/\text{speed-of-light}$ of a second”. This definition can be used directly to measure the time-of-flight of a laser pulse in order to measure long distances starting from room dimensions to the distance between earth and moon. Light Wavelength has been also recommended for the measurement of short distances accurately.



A: Optical Frequency Measurement

- 1- Accurate frequency measurement of He-Ne lasers at 633 nm (Primary length standards).
- 2- Accurate frequency measurement using femtosecond frequency comb (500-2100 nm).
- 3- Displacement interferometer calibration (wavelength).



B: Spectroscopy

- 1- High resolution laser spectral analysis.
- 2- Detection of gas traces using tunable lasers.
- 3- Determination of fine and hyperfine structure of absorptions.
- 4- Detection of the two-photon and saturation (Doppler free) absorptions.
- 5- Spectrometers calibration (wavelength scale).



C: Optical Communication

- 1- OTDR calibration (loss and distance scale).
- 2- Accurate wavelength measurement for DWDM lasers.
- 3- Optical spectrum analyzer (OSA) calibration.
- 4- Fiber power meter calibration.
- 5- Chromatic dispersion measurement.
- 6- Polarization mode dispersion measurement.
- 7- SDH analyzers calibration.
- 8- Variable attenuator calibration
- 9- Check of splicers operation.



D: Medical Applications

- 1- Pulse width measurement of nano- and femtosecond lasers.
- 2- Laser beam profile measurement and focusing diameter.
- 3- Laser wavelength measurement.
- 4- Laser peak power and Energy measurement (in collaboration with radiometry lab.).



E: Distance applications

- 1- Laser Doppler velocimeter calibration.
- 2- Laser Distance meter calibration (stand-alone and built-in in total stations).
- 3- Alignment Laser calibration (ex. shaft alignment lasers).
- 4- GPS receivers calibrations.
- 5- Range finders calibration.

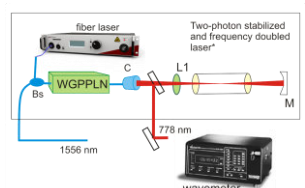


D: Training

Our laboratory provides training courses in any of the above mentioned measurement capabilities or even devices. Some courses are also suitable for university students. The courses will be provided by our highly qualified researchers. Available training courses will be announced at our web site*. Special courses can be provided upon request.

The main areas of research:

- 1- Cost effective frequency stabilized laser sources at different wavelengths for length measurements.
- 2- Two- Photon stabilized laser at 778 nm and 1.56 μm for Telekom applications (DWDM).
- 3- High resolution tunable laser spectroscopy.
- 4- Absolute length measurement using tunable lasers and femtosecond laser comb.



Customers

- 1- Telecom Egypt
- 2- ...
- 3- ...
- 4- ...
- 5- ...

End and Line Standards Laboratory

The laboratory of End and Line Standards is one of the laboratories of the division of Length Metrology and Engineering Precision. The laboratory provides traceability to industrial units as it keeps, maintains, and calibrates the secondary standards of length. It also provides testing of optical components and optical devices in accordance with the international standards.

The laboratory provides consultation to industrial units in addition to the training courses and research works that serve industrial and scientific sectors. New topics are added to the research work of the laboratory and conduct the nonlinear optical properties of the materials.

Calibration and measurement services

- 1- Calibration of short end standards "gauge blocks" (0.5-100 mm) laser.
- 2- Calibration of long end standards "gauge blocks" (range >100mm - 1000mm) using laser.
- 3- Calibration of line scale and encoders.
- 4- Calibration of graduated lenses with uncertainty.
- 5- Calibration of auto-refractometers (1.3 – 1.7).
- 6- Calibration of standard quartzes.
- 7- Calibration of polarimeters and polariscopes.
- 8- Ellipsometric measurements.
- 9- Calibration of Fine dimensions using dimensional microscope.
- 10- Calibration of displacements and straightness.

Research

- 1- Developing of interferometric techniques and methods of measurement
- 2- Employing of diode laser in dimensional measurements
- 3- Monte Carlo method in uncertainty evaluation
- 4- Application of holography in testing fine surfaces
- 5- Optical fibers properties
- 6- Nonlinear optics
- 7- Measuring length, surface defects, vibration, velocity, expansion using speckle

International Recognition and Accreditation

The laboratory is involved in international comparisons organized by EURAMET and AFRMET.

Training courses

We provide the following training courses:

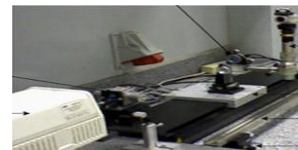
- 1- Calibration of long gauge blocks (4 days)
- 2- Calibration of standard scales (4 days)
- 3- Calibration of short gauge blocks (4 days)
- 4- Polarization and refractive indices (4 days)

Equipment

Calibration of Short and Long Gauge Blocks using lasers



Calibration of line scales and encoders



Calibration of graduated lens and fine dimensions



Calibration of distance, displacement, and straightness



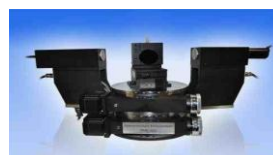
Calibrations of Refractometers (Refractive index & Brix)



Calibration of Polarimeters



Calibration of Standard Quartz



Ellipsometric measurement

Customers

- 1- Tank factory, Air forces, Egypt Air, Sakr
- 2- Exports & Imports Surveillance, Marble industries
- 3- International company for food industries, Sugar industries
- 4- Eastern company, Survey company
- 5- Paints & Chemicals industries (BETEK)

Engineering & Surface Metrology Laboratory (ESM)

The ESM Lab is within the Division of Length and Precision Engineering Metrology (LPEM) at NIS

Scope

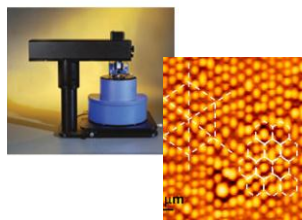
The ESM lab is responsible for carrying out researches, calibration and measurements in the following fields:

- Metrology of universal, Coordinate measuring machines (UMMs; CMMs) as well metrology of machine tools (m/c tool metrology)
- Metrology of geometrical shapes (three dimensional, compound shapes, free shapes).
- Metrology of angles.
- Metrology of gauges and simple measuring tools (calipers, micrometers ... etc).
- Metrology of Surfaces.
- Metrology of non-contact system and applications of optical and interferometric methods of length measurements.
- Measurements protocols and innovated methods for production metrology of products (inspection and quality control).
- Long distance measurements and calibrations.
- Nanometrology and metrology of thin films.

Calibration of Surfaces Instruments

Metrology UMM, CMM and m/c tools

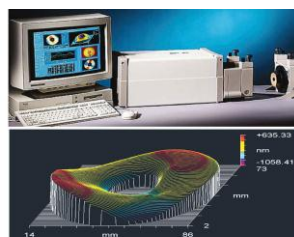
The laboratory carries out verification and calibration for UMM, CMM and M/C tools also testing computer numerical controlled (CNC) machines using laser's system according to recent specifications and standards.



Metrology of Surface

The lab carries out surface topography measurements suitable for a variety of surfaces ranging from roughly machined surface to very fine surface down to the nanometer scale.

A Form Talysurf[®], a Mitotoyo[®] hand roughness tester, Zigo[®] white light interference microscope (white light scanning and phase shift interferometry), a Scanning Probing Microscope SPM (Atomic force microscopy, ... etc) are available. Also the flatness, parallelism and curvature of large optical parts can be calibrated using a horizontal Zigo[®] laser interference microscope (large objects).



قياس تداخل يعمل بالليزر

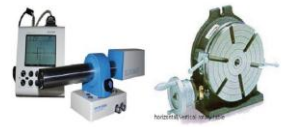
Coordinate Metrology

The laboratory has a precise Zeiss-Prismo coordinate Measuring Machine (CMM) for measure the dimensional and geometrical surface metrology of simple and complicated parts with size of 700mm x 900mm x 500mm with resolution down to 0.1 μ m.



Angle Measurement

The lab has different system for angular measurements. Two Elcomat[®] Auto collimators and an Elegant[®] (hp) laser Measuring Systems are available. Capabilities for flatness, straightness and perpendicularity for machines are available.



Roundness Measurement

A Taylor Hobson Talysond[®] as well as Zeiss-Priso[®] CMM are available and capable of measuring insides and outside rings and cylinders up to 355 mm diameter and with resolution of down to 50 nm.



Calibrated of Gauge Blocks (GBs)

Gauge blocks of grades 1 & 2 are calibrated using tactile methods according to ISO standards with resolution down to 0.01 μ m.

Calibration of Universal Microscopes, Profile Projectors and other simple hand measuring instruments and tools are carried out using different dimensional standards traceable to SI unit of length

Training Courses

The lab offers several training courses in the fields of its scope. The duration of the course is commonly ranged from few days to one week. The courses are mostly practical application in the laboratories with hands on the Instruments as well as explanation lectures.

Staff

There are 15 specialists (3 PhD, 2 MSc, 6 BSc, 4 technicians and 2 secretarial) with a group of professors and retired professors.

Some Important Clients:

- 1- Petroleum Companies.
- 2- Suez Canal Authority Companies.
- 3- Government and Privets Authorities.
- 4- Industrial Arab Authority Companies.
- 5- Local Automotive Industrial Companies.

وزارة البحث العلمي
المعهد القومى للمعايرة

National Institute of Standards
NIS



NIS Services

- Calibration
- Reference Material
- Total Quality Management
- National Proficiency Testing Laboratory
- Training



Calibration

Calibration is the process of determining the deviation of the readings of the clients' equipment and the true readings. The calibration processes are carried out using the primary standards that located in one place only within the Arab Republic of Egypt, the National Institute of Standards (NIS-Egypt), where the main job of the NIS is to maintain, develop and disseminate the measurement standards within the Arab Republic of Egypt. The technical office for calibration is the link between all sectors of Egypt from institutions, companies, bodies and factories in the industrial, agricultural and commercial fields and between the laboratories of NIS to provide wide services aimed to put the Egyptian product to the highest quality and increase its competitiveness in the domestic and international market. The calibration process is one of the basic requirements for accreditation. We are delighted to join us as a success partner. You are in safe hands.

National Proficiency Testing Laboratory (PTL)

National Proficiency Testing Laboratory (PTL) at the National Institute of Standards (NIS-Egypt) was started on 2007 as a working group. It was established legally as a laboratory directly under NIS president to ensure the impartiality and confidentiality. It is established to take the responsibility for all tasks in development and operation of proficiency testing schemes.

Proficiency testing, more commonly called PT, determines the performance of individual laboratories (participants) for specific test/calibration and is used to monitor laboratories' continuing performances. PT is a means of checking and ensuring the quality of lab's test/calibration results as stated in clause 5.9 of ISO/IEC 17025.

In a proficiency test one or more artifacts/samples are sent around between a number of participating laboratories. Each laboratory measures/calibrates the artifacts according to a given set of instructions and reports its results to NPTL. The results reported by each laboratory are compared to the assigned value. The assigned value can be determined in various ways. The two most common ways are to use a reference laboratory, reference material or use the weighted average of the values reported by the participants.

NPTL uses reference laboratories to provide the reference values. The reference laboratories are chosen by the technical advisor for the proficiency test in question based on his or her knowledge of the laboratory and the uncertainty the laboratory is able to quote for the measurand (best measurement/calibration capabilities). The reference laboratories are generally accredited laboratories (accredited for the measurand in question), which have been assessed by the technical advisor. Published CMCs also are of major concerns for National metrological organizations (NMIs)

There are different ways to evaluate the results of a proficiency test. For the type of proficiency tests offered by NPTL, the result reported by a participating laboratory for a measure and is compared to the reference value by calculating the En value (for calibration) and z or ξ scores for testing.

PT can also validate the participating laboratory's measurement method, technical training, traceability of standards, and uncertainty budget.



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Reference Material

Mission

- Reference materials Laboratory is a primary metrology laboratory (Metrology in Chemistry), it develops national measurement standards (CRM).
- Development and improvement of certification, harmonization and compatibility of reference materials with international standards.
- Dissemination of traceability to the national system and through it to the international system.
- Cooperation with international and regional metrology organizations [RMOs] for transferring knowledge to national system.
- RM Lab. offers technical support to industry in everything related to measurements, reference materials and data to establish traceability of their measurements

Training

The training administration is the link between all sectors of Egypt of institutions, companies, bodies and factories in the fields of industrial, agricultural and commercial and between the laboratories of NIS to provide wide specialized training services in all areas of metrology that included in the training plan of NIS at the local, Arab and international levels. NIS receives the training seekers in various fields of metrology and the members of the laboratory concerned with the implementation of the training course to explain the principles and activities of the laboratory for the trainee in theory and practice. At the end of the training course the trainee gain a lot of information that qualifies him to practice his work with the required precision and craftsmanship.

Total Quality Management



Training Courses:

- | | |
|----------------------------------------------------------------------------------------------------|-----------------------------------|
| • ISO 9001:2015 - Quality Management System " understanding and implementations" | • ISO 9001:2015 Lead Auditor |
| • ISO 9001:2015 Transition - Identifying the changes | |
| • ISO 9001:2015 Internal Auditor | |
| • ISO 14001 "understanding and implementations" | • ISO 14001:2015 Internal Auditor |
| • ISO 14001:2015 Transition - Identifying the changes | |
| • ISO 14001:2015 Lead Auditor | |
| • BS OHSAS 18001 Standards " understanding and implementations" | • OHSAS 18001.:2007 Lead Auditor |
| • OHSAS 18001 Internal Auditor | |
| • Introduction for ISO/IEC 17025 Standards " understanding and implementations" | |
| • ISO/IEC 17025 Internal Auditors | |
| • ISO/IEC 17025 Lead Assessors Introduction for ISO/IEC 17025 Standards | |
| • Measurement Uncertainty - Confidence In Measurement (Based On The Requirements Of ISO/IEC 17025) | • Statistical Process Control |
| • Project Management Professional (PMP) | • Total Quality Management |
| • Workplace health and safety (WHS) " applications for different fields" | |

Consultations

- Qualifying the companies to get a certification of ISO 9001:2015- Quality Management System
- Qualifying the companies to move from ISO 9001:2008 to 9001:2015
- Qualifying the companies to get a certification of ISO 14001
- Qualifying the companies to get a certification of BS OHSAS 18001
- Qualifying the companies to get a certification of ISO/IEC 17025